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U.S. Army Center for Health Promotion and Preventive Medicine

PYROTECHNICS HEALTH RISK ASSESSMENT
NO. 39-EJ-1485-99
RESIDENTIAL EXPOSURE FROM INHALATION OF
AIR EMISSIONS FROM THE M159 WHITE STAR
CLUSTER SIGNAL ILLUMINATION
DEPARTMENT OF DEFENSE IDENTIFICATION CODE: L307





Prepared by:

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U.S. Army Center for Health Promotion and Preventive Medicine

The lineage of the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) can be traced back over 50 years. This organization began as the U.S. Army Industrial Hygiene Laboratory, established during the industrial buildup for World War II, under the direct supervision of the Army Surgeon General. Its original location was at the Johns Hopkins School of Hygiene and Public Health. Its mission was to conduct occupational health surveys and investigations within the Department of Defense's (DOD's) industrial production base. It was staffed with three personnel and had a limited annual operating budget of three thousand dollars.

Most recently, it became internationally known as the U.S. Army Environmental Hygiene Agency (AEHA). Its mission expanded to support worldwide preventive medicine programs of the Army, DOD, and other Federal agencies as directed by the Army Medical Command or the Office of The Surgeon General, through consultations, support services, investigations, on-site visits, and training.

On 1 August 1994, AEHA was redesignated the U.S. Army Center for Health Promotion and Preventive Medicine with a provisional status and a commanding general officer. On 1 October 1995, the nonprovisional status was approved with a mission of providing preventive medicine and health promotion leadership, direction, and services for America's Army.

The organization's quest has always been one of excellence and the provision of quality service. Today, its goal is to be an established world-class center of excellence for achieving and maintaining a fit, healthy, and ready force. To achieve that end, the CHPPM holds firmly to its values which are steeped in rich military heritage:

- ★ Integrity is the foundation
 - ★ Excellence is the standard
 - ★ Customer satisfaction is the focus
 - ★ Its people are the most valued resource
 - ★ Continuous quality improvement is the pathway

This organization stands on the threshold of even greater challenges and responsibilities. It has been reorganized and reengineered to support the Army of the future. The CHPPM now has three direct support activities located in Fort Meade, Maryland; Fort McPherson, Georgia; and Fitzsimons Army Medical Center, Aurora, Colorado; to provide responsive regional health promotion and preventive medicine support across the U.S. There are also two CHPPM overseas commands in Landstuhl, Germany and Camp Zama, Japan who contribute to the success of CHPPM's increasing global mission. As CHPPM moves into the 21st Century, new programs relating to fitness, health promotion, wellness, and disease surveillance are being added. As always, CHPPM stands firm in its commitment to Army readiness. It is an organization proud of its fine history, yet equally excited about its challenging future.

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REPLY TO

MCHB-TS-EHR

PYROTECHNICS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-99 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE M159 WHITE STAR CLUSTER SIGNAL ILLUMINATION

EXECUTIVE SUMMARY

This assessment evaluated the potential for human health effects to offsite residents breathing air emissions following use of the M159 white star cluster signal illumination (M159) during training exercises. Pyrotechnics, such as the M159 white star cluster signal illumination, are used by the military for signaling, obscuring, and illuminating during training and combat. Study results showed that no adverse health impacts are expected, to the hypothetical resident, from inhalation of the air emissions from the M159 white star cluster signal illumination.

To conduct this study, air emissions from the M159 white star cluster signal illumination were collected in a test chamber (Bang Box) at the Dugway Proving Ground, Utah. This information was then used in an air dispersion model to determine ambient air concentrations at a location 100 meters (328 feet) downwind from the site where the M159 white star cluster signal illumination was activated. Since the training facility in this study is hypothetical, the air model used assumptions that provided conservative estimates of air concentrations.

Modeled air concentrations were combined with exposure information (e.g., number of exposures per year) to estimate the amount of substances the hypothetical resident breathes. This intake was combined with the substance's health information, which was obtained from agencies such as the U.S. Environmental Protection Agency, to determine if there is a potential for health risks from inhalation of these substances.

The health risk study included both long-term (30 years) and short-term (15-minute or 1-hour) exposures to modeled substance concentrations. Study results showed no potential for health risks to the hypothetical resident from inhalation of air emissions from the M159 white star cluster signal illumination.

Readiness thru Health

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LIST OF ACRONYMS

AEC U.S. Army Environmental Center

AEGL Acute Exposure Guideline Levels

AIHA American Industrial Hygiene Association

ATV Acute Toxicity Value

DODIC Department of Defense Identification Code

DOE U.S. Department of Energy

EPA U.S. Environmental Protection Agency

ERPG Emergency Response Planning Guidelines

HBSL Health-Based Screening Level

NAAQS National Ambient Air Quality Standards

NAC/AEGL National Advisory Committee for Acute Exposure Guideline Levels

NEW Net Explosive Weight

NO_x Nitrogen Oxide

OEL Occupational Exposure Limit

PM₁₀ Particulate Matter under 10 micrometers in size

PRG Preliminary Remediation Goals

RBC Risk-Based Concentration

RfC Reference Concentration

TEEL Temporary Emergency Exposure Limits

TPCWG Total Petroleum Criteria Working Group

TSP Total Suspended Particulates

USACHPPM U.S. Army Center for Health Promotion and Preventive Medicine

PYROTECHNICS HEALTH RISK ASSESSMENT NO. 39-EJ-1485-99 RESIDENTIAL EXPOSURE FROM INHALATION OF AIR EMISSIONS FROM THE M159 WHITE STAR CLUSTER SIGNAL ILLUMINATION

PURPOSE

This document presents the evaluation of the potential for human health effects to offsite residents breathing air emissions following use of the M159 white star cluster signal illumination during training exercises.

2. AUTHORITY

Memorandum, U.S. Army Environmental Center, 4 June 1999, Subject: Pyrotechnics Risk Assessment.

3. REFERENCES

See Appendix A.

4. BACKGROUND

a. PYROTECHNICS AND THEIR USE

The term pyrotechnics is derived from the Greek words "pyr" and "technē" meaning fire and art, respectively. This term is often used interchangeably with the term firework. Examples of pyrotechnics include distress flares and fireworks for commercial (e.g., public displays) and consumer (e.g., sparklers) use. Every year, during Independence Day and New Year's Eve, fireworks are used for public displays across the country. During the 1998 Olympic Wintergames in Nagano, Japan, almost 5000 pyrotechnics were launched during a firework display which lasted for 8 minutes.

The military uses pyrotechnics for four purposes: 1) as a method of communication through the use of signals, 2) to produce smoke to reduce enemy effectiveness, 3) for illuminating the field, and 4) to simulate battle conditions during training exercises. Pyrotechnics play an important role in both military training and combat. Therefore, it is important that our troops are adequately trained to use them properly.

b. WHAT IS THE M159 WHITE STAR CLUSTER SIGNAL ILLUMINATION?

The M159 white star cluster signal illumination (M159) is one of several types of ground pyrotechnic signals. When activated, it produces five white-colored free-falling stars. It is about 10 inches long, 2 inches wide, and weighs approximately 1 pound (Reference 1).

c. USE OF THE M159 WHITE STAR CLUSTER SIGNAL ILLUMINATION

The M159 is used for signaling or illuminating. A rocket containing the signal is launched from a hand-held device. After launching, the rocket reaches a height of about 200 feet at which point, the star clusters are released. The stars extend to a height between 650 and 800 feet (about the height of a 65 story building) (References 2, 3). Troops use the star cluster signals to communicate with one another. The light it provides can also be used for other purposes. For example, it can provide light for nighttime ground operations or it can be used to reveal an enemy's suspected hiding place.

d. ASSESSMENT SUMMARY

The approach for this study consisted of two main parts: air dispersion modeling and exposure assessment. These are briefly discussed in the paragraphs below. Sections 5-7 present a more explicit discussion of the methodology used for this study.

Data generated in the "Bang Box" at the Dugway Proving Ground, Utah (Reference 4), were used with an atmospheric dispersion model (Reference 5) to estimate the average concentrations that would be experienced by an offsite resident. Since this study is designed to provide results that would be applicable to most Army training facilities, the training area used in this evaluation was a hypothetical one. In addition, air modeling parameters were selected to mimic worst-case conditions.

The exposure assessment included calculations of time-averaged concentrations for both long-term (chronic) and short-term (acute) exposures. For the purpose of this study, air concentrations were averaged over 30 years for chronic exposures and 1 hour or 15 minutes for acute exposures. These concentrations were compared to chronic health-based screening levels (HBSLs) established by the U.S. Environmental Protection Agency (EPA) or acute toxicity values (ATVs) established by selected agencies depending on the exposure duration (i.e., 30 years versus 1 hour or 15 minutes). If the chronic or acute concentrations (C_{chronic} and C_{acute}) were greater than these screening levels, further analysis would be warranted to determine the potential for health effects. It should be noted that concentrations greater than the screening levels do not indicate an onset of health effects, but rather the potential for such.

5. METHODS AND DATA COLLECTION

a. EMISSION FACTORS

The air modeling emission rates were derived from the pyrotechnics emission studies conducted at Dugway Proving Ground, Utah (Reference 4). These

studies sampled air emissions from the firing of weapons and/or munitions used in training. The purpose of this sampling was to identify and quantify the air emissions. The data provided by Dugway Proving Ground included the identification of the munitions item and compounds sampled, net explosive weight (NEW) of the item, vertical and horizontal dimensions of the plume from thermograph data and video, and compound emission factors. This data is included in the tables in Appendix B.

b. AIR MODEL

(1) BACKGROUND

Air dispersion models are available to mathematically simulate atmospheric conditions and behavior to predict downwind concentrations caused by emissions from various sources. However, specific models are not available to estimate the dispersion of emissions from the use of munitions in training. The emissions from munitions used in training result in ambient concentrations of compounds at various locations. The magnitude and location of these concentrations depend on many factors including the amount and type of emissions, the behavior of the source, and meteorological conditions. Based on the evaluation of air dispersion models for military munitions, the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) recommended using the Integrated PUFF (INPUFF) model to estimate the dispersion of emissions from mobile pyrotechnics (Reference 6).

(2) MODEL DESCRIPTION

The INPUFF Model was developed to simulate dispersion from instantaneous or semi-continuous point sources. This Gaussian-integrated puff model is capable of addressing a puff type release over short periods of time, and computations can be performed for a single point source for multiple receptors. The algorithm used to calculate concentrations uses a vertically uniformed wind direction (with no chemical reaction) to compute the contribution of each puff at a receptor for each time step/interval.

(3) ASSUMPTIONS

Some assumptions were made to best represent the M159 in the air model. These assumptions were as follows:

(a) For unconventional sources with no physical stack dimensions, the initial horizontal and vertical dispersion values (σ_y and σ_z) of the released puff were used to define the dimensions of the puff. Therefore, plume rise and formation were not determined by characterizing flue gas exit velocity and stack diameter, as they are with conventional point sources. The initial

dimensions were set to values measured during Dugway Proving Ground testing and the dispersion of the initial cloud was modeled. The physical dimensions, including height and length of the puff or cloud, were estimated from the thermograph data recorded at every time step. The data also included minimum, mean, and maximum temperature readings during the duration of the emission test and were used to define the flue gas exit temperature. These puffs were then modeled at different release heights as depicted in Figure 1.

(b) The worst-case release scenario analysis was performed using EPA Risk Management Program Guidance (Reference 7). This guidance includes tables for estimating the footprint of chemical releases. These guidelines were intended to inform emergency responders of the worst possible accidental release, but not necessarily the most likely. The EPA has defined most default conditions for meteorological modeling parameters. Table 1 lists the parameters that were used in the model.

TABLE 1. AIR MODEL INPUT PARAMETERS

MODEL PARAMETERS	
Number of meteorological periods (NTIME)	1
Duration of each meteorological period (ITIME)	300 s
Number of updates to the source (NSRCDS)	100 per source
Duration between each source update/time-step (ISUPDT)	3 s
Total time modeled/Simulation Period (NTIME * ITIME)	300 s
SOURCE PARAMETERS	
Source/Stack Diameter	0.5 m for sources (1-6).
Source/Stack Height	See Table 2.
Source Exit Temperature	Varied for each source every time step (3 s) degrees Kelvin (K)
Exit Velocity	NA
Emission Rate	1 grams/second
Initial horizontal dispersion (σ _y)	Varied for each source every time step (3 s)
Initial vertical dispersion (σ _z)	Varied for each source every time step (3 s)
WORST CASE METEOROLOGICAL PARAMETE	
Wind Speed	1 m/s
Atmospheric Stability	Category F
Wind Direction	270° degrees West
Ambient Temperature	293 degrees Kelvin (K) (or 68 °F)
Worst case Receptor Location	100 m directly downwind

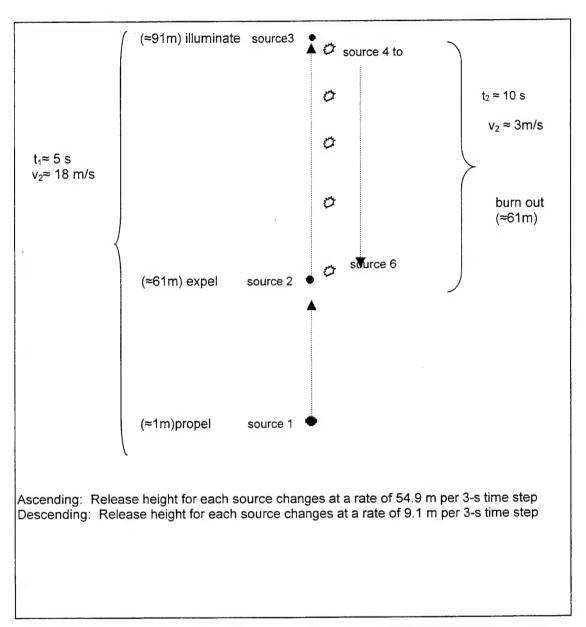


FIGURE 1. SCHEMATIC DIAGRAM OF THE TRAJECTORY OF THE M159

- (c) The resident used in this study was assumed to be directly downwind from the source. The meander of the puff is a major factor when estimating concentrations at given locations downwind from the source. Assuming that the resident is directly downwind from the source is the same as assuming that there is no puff meander and provides the most conservative modeled concentrations.
- (d) For the purpose of this study, the number of items per event was defined as the activation of one item during a twelve hour period.
- (e) Figure 1 provides a schematic diagram of the trajectory of the M159. The data for Figure 1 were obtained from References 1 and 8. The performance data provided estimated travel times (t), and velocities (v) at which the items ascend and descend.

(4) GENERAL METHODOLOGY

- (a) The INPUFF Model determined the amount of time it would take for the puff to pass over the receptor located 100 meters (m) downwind. The initial puff released migrates at constant wind speed of one meter per second (1 m/s) downwind. Using a distance of 100 m and assuming travel velocity of 1 m/s, it would take 100 s for the center of each puff to reach this receptor distance. The source was modeled at the appropriate release heights and intermediate concentrations were calculated by INPUFF at a receptor 100 meters downwind.
- (b) The model was run with a total runtime of 300 s to ensure that the total mass of the puff had passed the receptor and the source behavior recorded in the thermograph data was sufficiently simulated. Since the model is capable of providing 100 updates (puffs), each intermediate puff was assumed to be 300 s divided by 100 updates, which is 3 s. Calculated concentrations every time step (3 s) indicated that the puff reached the receptor within 78 s and dissipated below the lowest concentration the model could calculate in this instance of 1 x 10⁻¹⁰ grams/m³ within 135 s.
- (c) The star clusters were modeled as 6 different sources with different source parameters for each time step. A different release height with varying release temperatures was used for each source. Table 2 illustrates how the emissions for the M159 were separated into 6 different point sources and the emissions for each source were staggered over a burn time of 18 s.

TABLE 2: M159 SOURCE SIMULATION

Source No.	Height (m)	Unit Emission Rate of 1g/s per time step
1	1.0	0 to 3 s
2	56.0	3 to 6 s
3	91.0	6 to 9 s
4	82.0	9 to 12 s
5	73.0	12 to 15 s
6	64.0	15 to 18 s

^{*}The emission rates return to 0 g/s for all time steps not shown in the table. Note: the location of each of the sources with z representing the base elevation was modeled at (x,y,z)=(0,0,0)

(5) USE OF MODEL OUTPUT

The concentrations provided by the INPUFF model are based on a unit emission rate of 1 g/s from an emission source and does not represent any pollutant-specific concentration from the use of pyrotechnics. The relationship between the emission rate and predicted concentration is linear. Therefore, the ratio of the predicted concentration to the unit emission rate was multiplied by each pollutant-specific emission rate to provide pollutant-specific concentrations.

(6) DETERMINATION OF POLLUTANT-SPECIFIC EMISSION RATES

(a) The actual emission rate per item (ER₁) for each pollutant was calculated using the following equation:

$$ER_1 = \frac{M \cdot CV}{t}$$
 Equation 1

where:

 ER_1 = emission rate for one item (g/(item*sec))

M = total mass (lb) of pollutant emitted per item (lb/item)

CV = conversion factor (453.59 g/lb)

t = release duration in seconds (s) (References 1, 8)

Example 1 Sample Calculation Using Equation 1*:

$$ER_1 = \frac{(8.435E - 02)(453.59)}{(18)}$$

= 2.126E+00 g/(s*item)

*Calculation for total suspended particulates (TSP). Averaged adjusted emission factor of TSP in lb/item was obtained from Appendix B.

(b) The pollutant emission rate for an event (ER_{EV}) for each pollutant was calculated using the estimated number of potential items used in a training event according to the following equation:

$$ER_{EV} = ER_1 \cdot I$$

Equation 2

where:

 ER_{EV} = emission rate for the estimated number of potential items

used in a training event (g/s)

ER₁ = emission rate for one item (g/(item*sec))

/ = items per event (item/event)

Example 2 Sample Calculation Using Equation 2*:

$$ER_{EV} = (2.126E + 00)(1)$$

$$= 2.126E+00 g/s$$

* Calculation for TSP

(c) Pollutant-specific ambient concentrations for an event (CONC) were calculated using the following equation:

$$CONC = ER_{EV} \cdot \frac{UC}{ER_{unit}}$$
 Equation 3

where:

CONC = pollutant concentration based on the number of items used in a training event (g/m³)

 ER_{EV} = emission rate for the estimated number of items used in a training event (g/s)

 ER_{unit} = unit emission rate as used in the model (g/sec)

UC = concentration based on the unit emission rate (g/m³)

Example 3 Sample Calculation Using Equation 3*:

$$CONC = (2.126E + 00) \frac{(2.613E - 04)}{(1)}$$

 $= 5.554E-04 g/m^3$

* Calculation for TSP

c. EXPOSURE ASSESSMENT

- (1) EXPOSURE ASSUMPTIONS
- (a) Exposure assumptions were selected using a typical use scenario for the M159. This use scenario was developed based on consultation with the U.S. Army Environmental Center's (AEC) senior training advisor (References 9, 10). The frequency of use of the M159 was required to determine how much substance an offsite resident would be exposed to in the time period of interest (i.e., acute or chronic exposure). For the purposes of this study, a training scenario is defined as a day or session of training whereas a training event is defined as a single use of pyrotechnics. A training scenario may consist of multiple training events. Table 3 summarizes the specific assumptions used to determine how often the M159 is used during a training scenario.

TABLE 3: FREQUENCY OF USE FOR THE M159

Parameter	Value Used
Number of items used per training scenario	2
Number of items used per training event	1
Number of training events per scenario	2
Time between events	One at the beginning of 24 hours and one at the end
Number of scenarios per year	5

(b) To estimate the air emissions, it was assumed that one M159 was activated during a twelve-hour period. The puff that resulted from this event was modeled to a point 100 meters downwind. Since the unit emission rate was calculated using a runtime of 300 seconds, each event was also assumed to last 300 seconds (or 5 minutes).

(2) TIME-AVERAGING

For the chronic assessment, time-averaged concentrations were calculated using the EPA's default residential exposure duration of 30 years (this value assumes that the resident spends 30 years at the same residence). This was done to derive concentrations that would be consistent with the exposure duration used by the EPA so that estimated substance concentrations could be compared to their respective health-based screening levels.

In this evaluation, training scenarios occur five times a year (References 9, 10). Using the default residence time established by the EPA, the assumption was made that someone could be exposed to five training scenarios per year for 30 years.

(a) The average daily concentrations were calculated using Equation 4. An example calculation using TSP is included in Example 4. It should be noted that the average modeled concentration was converted from g/m³ to µg/m³ before it was used in Equation 4.

$$C_d = \frac{CONC \cdot ET \cdot EF_{day}}{1440}$$
 Equation 4

where:

 C_d = average daily concentration (μ g/m³) CONC = average modeled concentration (μ g/m³)

ET = exposure time (minutes/event)

*EF*_{day} = exposure frequency (events/day) 1440 = unit conversion from minutes to day

Example 4 Sample Calculation Using Equation 4:

$$C_{d(TSP)} = \frac{(5.554E + 02)(5)(2)}{1440}$$
$$= 3.857E-00 \,\mu\text{g/m}^3$$

The averaged modeled concentration (CONC) for TSP was obtained from Appendix B. The exposure parameters were obtained from Table 4.

(b) Average chronic concentrations were calculated using Equation 5. The resulting concentration (C_d) from Equation 4 was used in Equation 5 to determine the average chronic concentrations. Example 5 shows how this calculation was performed.

$$C_{chronic} = \frac{C_d \cdot EF_{year} \cdot ED}{AT}$$
 Equation 5

where:

 $C_{chronic}$ = average chronic concentration (μ g/m³) C_d = average daily concentration (μ g/m³) EF_{year} = exposure frequency (days/year) ED = exposure duration (years) AT = averaging time (days)

(for carcinogenic endpoint, AT = 70 years x 365 days; noncarcinogenic endpoint, AT = ED x 365 days)

Example 5 Sample Calculation Using Equation 5:

$$C_{chronic(TSP)} = \frac{(3.857E + 00)(5)(30)}{(30)(365)}$$
$$= 5.283E-02 \ \mu g/m^3$$

The average daily concentration was calculated as shown in Example 4. The exposure parameters were obtained from Table 4.

(c) This study assumed that the same person would be exposed 5 days every year for 30 years. Table 4 lists the exposure parameters used in Equations 4 and 5.

TABLE 4: EXPOSURE PARAMETERS USED TO DETERMINE TIME-AVERAGED CHRONIC AIR CONCENTRATIONS

Exposure Parameter	Value Used
Exposure Time (ET)	5 minutes/event
Exposure Frequency (EF _{day})	2 events/day
Exposure Frequency (EF _{year})	5 days/year
Exposure Duration (ED)	30 years

- (d) Unlike the chronic evaluation, guidance for evaluating acute exposures is not currently available. Due to the nature of the use of pyrotechnics and short duration of the concentration plume, acute exposures cannot be overlooked. For the purpose of this study, acute exposure is defined as a 1-hour or 15 minute exposure. The 1-hour or 15 minute acute exposure averaging times allow for comparison with guidelines developed specifically for emergency planning purposes (see discussion on acute toxicity below). This is a conservative assumption since the air model indicated that the hypothetical resident is not expected to be exposed for more than 5 minutes to the concentration plume following activation of the M159.
- (e) The average acute concentrations were computed using Equation 6. The exposure frequency is based on the number of events per hour or 15 minutes depending on the guideline used for comparison. Example 6 contains a sample calculation of this equation. Since TSP has no acute toxicity value, an acute concentration was not determined for this substance. Therefore, nitrogen oxide (NO_x) was used for the example calculation.

$$C_{acute} = \frac{CONC \cdot ET \cdot EF_{hour}}{60}$$
 Equation 6

where:

C_{acute} = average acute concentration (μg/m³) CONC = average modeled concentration (μg/m³) ET = exposure time (minutes/event)

EF_{hour} = exposure frequency (events/hour)

60 = unit conversion, 60 minutes/hour

Example 6 Sample Calculation Using Equation 6:

$$C_{acute(NOx)} = \frac{(1.59E + 01)(5)(1/0.25)}{60}$$
$$= 5.29E + 00 \ \mu g/m^3$$

The average acute concentration (CONC) was obtained from Appendix B. For NO_x , the acute toxicity value is based on a 15-minute exposure (TEEL-1). Therefore, the acute concentration was adjusted so that C_{acute} can be compared with its toxicity value.

d. TOXICITY ASSESSMENT

The potential for health risks was determined by comparing time-averaged air concentrations to health-based screening levels, which are developed from a substance's known toxicity. These toxicity values typically include different levels of safety factors depending on the level of confidence of the critical study. Appendix C contains a table of screening values used for the chronic and acute evaluations.

(1) CHRONIC ASSESSMENT

- (a) The chronic assessment was evaluated using a screening approach. Using this method, a substance's estimated time-averaged air concentration was compared to its HBSL. If this ratio was less than one, no further analysis was required. This approach is conservative because the exposure assumptions used by the EPA, to establish HBSLs, assume that the resident is exposed for 350 days per year (assuming 2 weeks vacation per year). Since the training scenarios, in which the M159 is used, are not expected to exceed 5 days per year, HBSLs specific to this study (if they were developed) would likely be higher.
- (b) HBSLs were obtained from the EPA, primarily from Region 3 and Region 9 (References 11, 12). To ensure that the most recent information was used, the Internet sites of both regions were checked. Although the general approach used by both Region 3 and Region 9 is the same, the exposure assumptions differ enough so that final recommended screening levels can vary to a certain degree. In both methods a substance's HBSL is selected

- using the toxicity endpoint that derives a lower concentration. For example, if a substance has a known systemic toxicity and is a carcinogen, concentrations were calculated using both toxicity information. The lower concentration was then selected as the recommended screening level to maintain a conservative approach.
- (c) A hierarchy was developed in order to quantitatively evaluate for as many of the identified substances as possible. Since the methodology used by Region 9 results in lower HBSLs than Region 3, the Region 9 preliminary remediation goals (PRGs) were used first. Region 3's risk-based concentrations (RBCs) were only used when a PRG was not available. The only exception was for chromium (VI) [Cr (VI)] where Region 9 used a carcinogenic toxicity value that was seven times greater than the EPA's recommended value to develop its screening level for inhalation exposure (Reference 13). Since the EPA does not advocate the application of this multiplication factor, the RBC for Cr (VI) was used instead of the PRG.
- (d) Some substances have neither PRGs nor RBCs because they have their own set of regulatory standards. Under the Clean Air Act, the EPA is required to establish National Ambient Air Quality Standards (NAAQS) (Reference 14) for several substances considered harmful to public health and the environment. Currently, NAAQS are available for six substances, of which carbon monoxide, nitrogen dioxide, lead, sulfur dioxide, and particulate matter < 10 micrometers (PM₁₀) have been detected in the M159 Bang Box study. The NAAQS for the longer averaging time were used for the chronic evaluation. Depending on the substance, this can range from an 8-hour average to an annual average. In addition, since the majority of the measured total suspended particulates (TSP) were PM₁₀ (Reference 4), the NAAQS for PM₁₀ was used to evaluate the potential for health effects from exposure to TSP.

Example 7 Sample Calculation Comparing a Substance's Estimated Chronic Concentration to Its HBSL:

$$\frac{C_{chronic(TSP)}}{HBSL} = \frac{5.283E - 02}{5E + 01}$$
$$= 1.1E-03 \text{ (or } 0.001) < 1$$

Note that HBSL is the health-based screening level of TSP. For TSP, the HBSL is based on the NAAQS. In this case, the resulting ratio is three orders of magnitude less than 1.

- (e) Many petroleum hydrocarbons were detected but do not have specific screening levels. Therefore, the approach recommended by the Total Petroleum Criteria Working Group (TPHCWG) (Reference 15) was adopted to evaluate petroleum hydrocarbon mixtures. Based on the working group's assessment of various hydrocarbons, they recommended that mixtures be separated according to a substance's number of carbons and its chemical class (i.e., aliphatic or aromatic¹). Generally, as a substance's carbon number increases, its molecular weight increases and it is therefore, not a substance of concern via inhalation. The working group also concluded that aromatic hydrocarbons tend to be more toxic than aliphatic hydrocarbons (Reference 15).
- (f) Table 5 tabulates the inhalation toxicity values used to evaluate exposure to petroleum mixtures. To be consistent with the methodology used in this study, the reference concentrations (RfCs) were converted to PRGs using Region 9 assumptions. The resulting PRGs are included in Table D-4 in Appendix D.

TABLE 5: SUMMARY OF RfCs USED FOR PETROLEUM HYDROCARBONS (Reference 15)

Carbon Range	Aromatic Inhalation RfC (mg/m³)	Aliphatic Inhalation RfC (mg/m³)
C ₅ – C ₆ C _{>6} – C ₈		18.4
C>7 - C8	0.4	
$C_{>8} - C_{10}$ $C_{>10} - C_{12}$ $C_{>12} - C_{16}$	0.2	1.0
C _{>16} - C ₂₁ C _{>21} - C ₃₅	NA	NA

NA = not applicable for high molecular weight TPHs (C_{>16}) because compounds in this carbon range are not volatile and therefore, inhalation is not a pathway of concern.

(2) ACUTE ASSESSMENT

(a) As previously indicated, an acceptable method for assessing acute health effects is not currently available. It was not until recently that EPA guidance addressed the need to evaluate acute health effects from inhalation (Reference 16). Even then, acute toxicity data for risk assessment purposes were not readily available. The EPA recognized this deficiency

¹ Aliphatic hydrocarbons are hydrocarbons in which the carbon atoms are joined by single covalent bonds consisting of two shared electrons (e.g., butane). Aromatic hydrocarbons have ring structures (e.g., benzene) (Reference 21).

and spearheaded the National Advisory Committee for Acute Exposure Guideline Levels for Hazardous Substances (NAC/AEGL Committee). However, AEGLs are currently available for only a handful of substances.

- (b) To circumvent this problem, several state regulatory agencies have suggested that guidelines developed for emergency purposes be used in the interim. Although suggestions have been made to use occupational exposure limits (OELs) by applying additional safety factors (References 17, 18), OELs were not used in this study because they introduce even more uncertainty than the use of emergency guidelines. OELs are designed to protect the workplace environment and assume 8 hours a day, 5 days a week exposures. By definition, these exposures are more chronic than acute.
- (c) In comparison, emergency planning guidelines are more appropriate because they are typically developed exposures of 1-hour or less. In addition, safety factors may also have been included depending on the agency that develops these guidelines, so that the values would be protective of the general population.
- (d) Emergency Response Planning Guidelines (ERPGs) published by the American Industrial Hygiene Association (AIHA) (Reference 19) and the Temporary Emergency Exposure Limits (TEELs) developed by the U.S. Department of Energy (DOE) (Reference 20) were used for this study; specifically the ERPG-1s and the TEEL-1s. Since TEEL-1s are intended for 15-minute exposures, air concentrations compared to TEELs were averaged over a 15-minute period as opposed to 1-hour in this assessment. The AIHA defines ERPG-1 as follows:

"The maximum concentration in air below which it is believed nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."

The DOE defines TEEL-1 as follows:

"The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor."

(e) For this study, ERPGs were selected prior to a substance's TEEL because they are vigorously reviewed before they are published whereas the TEELs are not. Example 8 shows a sample calculation of how a substance's estimated acute concentration is compared to its acute toxicity value.

Example 8

Sample Calculation of Comparing a Substance's Estimated Acute Concentration to Its Acute Toxicity Value:

$$\frac{C_{acute(NO_x)}}{ATV} = \frac{5.29E + 00}{2.7E + 05}$$
$$= 1.96E-05 \text{ (or } 0.00002) < 1$$

The acute toxicity value available for NO_x is a TEEL. In this example, the ratio is five orders of magnitude below 1, indicating that further analysis is not necessary.

6. RISK CHARACTERIZATION

Appendix D presents results from the M159 risk characterization. Note that for some substances, two concentrations were reported because of different analytical test methods (as noted in bold). In those instances, the higher concentration was used.

a. CHRONIC HEALTH RISK

The outcome indicated that no chronic health risks are expected from breathing the air emissions from the M159. Since all ratios were below one, no further evaluation was needed.

b. ACUTE HEALTH RISK

For the acute analysis, all ratios were below one, indicating that no acute health impacts are expected from breathing the air emissions from the M159. Since all ratios for the acute evaluation were below one, no further assessment was needed.

c. SUBSTANCES WITH NO TOXICITY DATA

Some substances were not quantitatively evaluated because they do not have established toxicity data. By conducting a semi-qualitative comparison of the concentrations of these substances to similar compounds with available toxicity data, it may be concluded that no potential for health effects would be expected from exposure to these substances.

d. FACT SHEET

A copy of the fact sheet submitted to AEC is included as Appendix E. The fact sheet uses the results from this study to summarize health concerns related to inhalation of M159 air emissions.

7. UNCERTAINTY DISCUSSION

The limitations inherent in modeling and the added conservatism of the evaluation contribute to the uncertainty of the study results. The risk assessment methodology typically includes safety factors that are embedded in the toxicity data to ensure adequate protection of the general population, particularly, susceptible individuals such as the sick, elderly, and children. Table 6 identifies areas of uncertainty associated with this assessment.

TABLE 6: TYPES OF UNCERTAINTY

Issue	Uncertainty	Direction of Effect
the state of the s	Modeling	
Modeled versus real- time sampling	The air concentrations in this study were modeled. Actual air concentrations taken from the field may be higher or lower.	Varies
Frequency of use for the M159	Actual frequency of use of M159s during a training event may be different from those stated in this report.	Varies
Hypothetical resident assumed to be located directly downwind	Unless the area around the training facility is populated, the chances that a person living directly downwind is low.	Overestimates
Use of worst-case meteorological conditions	To ensure that this study is applicable to most training areas, worst-case meteorological conditions were used in the air model.	Overestimates
and the second s	Exposure Assessment	Line and the second sec
Estimating time- averaged concentrations	Actual exposure from the M159 is intermittent. If one were to plot a person's exposure profile, the plot would consist of a series of spikes. Since current risk assessment methodology does not allow the evaluation of the potential for health risks as a function of time, a single concentration, averaged over the exposure duration was used. In this study, the exposure durations used were	Varies

TABLE 6: TYPES OF UNCERTAINTY

Issue	Uncertainty	Direction of Effect
	30 years and 1-hour or 15 minutes.	
Chromium speciation	All chromium was assumed to be present as Cr(VI), which is more toxic than Cr(III).	Overestimates
Comparing estimated concentration to established screening levels	The Region 3 and Region 9 HBSLs were developed using different exposure assumptions than those in this study, resulting in more conservative screening levels.	Overestimates
Screening assessment versus calculating an average daily intake	Calculating an average daily intake allows the use of scenario-specific assumptions. However, unless the ratio of concentration to screening level approaches one, a screening assessment is useful as a first-cut evaluation.	Varies
Exposure to other munitions	Other munitions are typically used during the same training event. These items may contain similar or different substances from those detected in the M159.	Underestimates
	Toxicity Assessment	
Lack of toxicity data	Some substances were not quantitatively evaluated because they have no known toxicity data.	Underestimates
Modifying and uncertainty factors for toxicity data	Modifying factors and uncertainty factors of varying degree are typically applied to toxicological values. These factors are used to conservatively account for extrapolating from animal studies for human health evaluation, and to conservatively account for variation in human populations.	Overestimates

8. CONCLUSION

Results indicated that residents who live as close as 100 meters directly downwind from training areas are safe from breathing air emissions from the M159. It is believed that the assumptions contained in this analysis are conservative enough to be protective of all the population including the sick, elderly, and children.

9. RECOMMENDATIONS

Since the results from this study are intended for a hypothetical training facility, they can vary depending on site-specific conditions. However, because of the conservative assumptions used (e.g., worst-case meteorological conditions, receptor located directly downwind, etc.) it is believed that most site-specific analyses would result in even lower concentrations. Therefore, the results from this evaluation should be applicable to most training facilities unless site-specific conditions vary significantly.

10. POINT OF CONTACT

Questions about this report should be directed to Ms. Hsieng-Ye Chang at (800) 222-9698 (ext 2953) or (410) 436-2953.

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APPENDIX A
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APPENDIX B AIR DISPERSION MODELING OUTPUT DATA

Table B-1: Air Modeling Output Data for Metals, Particulates, and Miscellaneous Compounds

2.613E-04 Pollutant Concentration 1 frem (grams/m³) CONC CONC CONC 5.554E-04 3.173E-04 3.173E-07 1.588E-05 1.588E-05 1.588E-05 1.588E-05 1.588E-05 1.133E-03 4.755E-07 ND ND ND ND S.083E-08 5.202E-08 7.702E-09 5.2559E-08 ND ND ND ND 4.184E-07 3.702E-09 5.176E-10 ND ND 6.176E-10 ND ND 4.184E-07 5.176E-10 ND ND A.184E-07 5.176E-10 ND ND A.184E-07	Compound					(i) means ber event (ii)		item/event	
Compound (Compound) Compound (Compound) Compound (Compound) Control (Compound) Cont	Compound		NEW, I	b = 0.32		release duration (t):	18		
Compound (mg/m²) Measured Actual Government of Commentation (mg/m²) Average Aglisand (mg/m²) Entition (mg/m²) Average Aglisand (mg/m²) Entition (mg/m²) Could (mg/m²) Publication (mg/m²) Mass of Pointant Concentration (mg/m²) Publication (mg/m²) Mass of Pointant Concentration (mg/m²) Publication (mg/m²) Could (mg/m²) Publication (mg/m²) Pub	Compound		Number o	if Items = 1		Unit Concentration (UC):	2.613E-04	(s/b)/ _s m/b	
STATE-OIL ND 2.58E-01 8.435E-02 3.828E-01 5.58E-01 3.773E-04 2.75E-00	culate			Average Adjusted Emission Factor (Ibrib NEW)	Average Adjusted Emission Factor (lb/item)		Pollutant Concentration 1 Kem (grams/m³)		• Event Pollurant Emission Rate 1 Item (g/sec)
STATE-OFF NAME STAT							2000		Adv. in
2.004E-01 ND 1.50E_01 ND ND ND ND ND ND ND N		+01	QN	2.636E-01	8.435E-02	3.826E+01	5.554E-04	2.126E+00	2.126E+00
Solution		+01	QN	1.506E-01	4.819E-02	2.186E+01	3.173E-04	1.214E+00	1.214E+00
Source of the control of the contr	HCI/CI,								
Mail		-	1.176E-02	QN	QN	QN	QN	QN	QN
1,490E-10			2.110E-02	1.065E-04	3.409E-05	1.546E-02	2.245E-07	8.590E-04	8.590E-04
1,430E+10	Diovin/Euran								
3.256E400 4.052E-01 2.183E-02 6.898E-03 3.169E+00 4.600E-05 1.761E-01 1.024E-00 4.600E-05 1.761E-01 1.024E-00 4.600E-05 1.761E-01 1.024E-00 4.600E-05 1.761E-01 1.024E-00 4.600E-05 1.024E-00 4.600E-05 1.024E-00 1.024E-00 4.600E-05 1.024E-00 1.024E-00 4.600E-05 1.024E-00 1.024E-00 4.600E-05 1.024E-00 1.02		40	CM	4 4445 40	2 054 17 42	4 0501 40	2 4045 45	0 2000 42	0 00000
3) 2.56E+00 4.052E-01 2.183E-02 2.181E-02 3.169E+00 4.600E-05 1.761E-01 1 0.24E-00 4.052E-01 7.33TE-03 2.19E-03 1.026E-03 1.024E+00 1.588E-06 2.54E-02 1 1.23TE-01 NM (b) 3.205E-03 1.026E-03 4.652E-01 4.53E-06 2.54E-02 7 4.13E-02 6.711E+02 5.378E-01 1.721E-01 7.808E+01 4.755E-07 4.38E-00 ND NM (a) NB ND ND ND ND ND NM (a) 1.463E-04 1.721E-01 7.808E-02 4.755E-07 1.830E-03 ND NM (a) ND ND ND ND ND ND NM (a) 1.463E-04 1.721E-01 7.808E-02 4.755E-07 1.808E-03 ND NM (a) 1.463E-04 1.721E-04 4.829E-02 4.755E-07 1.808E-02 ND NM (a) 1.463E-04 1.275E-03 4.756E-07 1.		01-10	ON I	1.141E-12	3.03 IE-13	1.536E-10	Z.404E-13	9.200E-12	9.200E-12
3.256E+00	CEM System								
1,024E-00 4,029E-02 7,537E-03 2,412E-03 1,094E+00 1,588E-05 6,078E-02 1,027E-01 1,028E-03 2,537E-01 1,028E-03 2,537E-01 1,028E-03 2,537E-03 2,537E-03 2,537E-03 3,262E-03 3,26	_	H	4.052E-01	2.183E-02	6.986E-03	3.169E+00	4.600E-05	1.761E-01	1.761E-01
1.23TE-01 NM (b) 3.205E-03 1.026E-03 4.652E-01 6.753E-06 2.584E-02 3.7473E-02 6.71E+02 5.379E-01 7.72ZE-05 3.276E-02 4.755E-07 1.820E-03 3.262E-02 3.155E-03 2.257E-04 7.22ZE-05 4.755E-07 1.820E-03 ND		Ļ	4.029E-02	7.537E-03	2.412E-03	1.094E+00	1.588E-05	6.078E-02	6.078E-02
March Marc			NM (b)	3.205E-03	1.026E-03	4.652E-01	6.753E-06	2.584E-02	2.584E-02
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to-phase Metals 4.372E-02 NM(a) 3.189E-04 1,021E-04 4,629E-02 6.720E-07 2.572E-03 n ND NM NM(a) NM(a) 1,021E-04 4,629E-02 6.720E-07 2.572E-03 n ND NM NM NM ND ND ND n ND NM(a) 1,463E-02 4,682E-03 2.14E-00 3.08E-05 1,100E-01 n ND NM 1,463E-02 4,682E-03 2.14E-0 3.08E-05 1,100E-01 n ND NM 1,453E-02 1,444E-07 6,544E-05 9,57E-10 3,66E-06 n NM 1,476E-04 NM 1,434E-07 1,444E-07 6,544E-05 9,57E-10 3,66E-05 n 1,204E-03 NM 1,434E-07 1,444E-07 1,432E-04 1,53E-06 1,53E-05 1,53E-06 n 1,457E-03 NM 1,457E-05 1,434E-07 1,43E-03 1,53E-06 1,53E-06 1,53E-03 1,53E-06 1,53E-06<			3.155E-03	2.257E-04	7.222E-05	3.276E-02	4.755E-07	1.820E-03	1.820E-03
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ND NM (a) NM (a) NM (a) NM (a) NM (a) A543E-07 (a) 6.294E-05 9.77E-10 3.663E-06 7.663E-05 NM (a) 8.748E-07 1.745E-03 9.77E-10 3.663E-06 7.084E-05 7.084E-05 7.084E-05 7.084E-03 7.084E-05 7.084E-05 7.084E-03 7.084E-05 7.084E-03 7.084E-03 7.084E-05 7.084E-03 7.084E-03 </td <td></td> <td>00+</td> <td>NM (a)</td> <td>1.463E-02</td> <td>4.682E-03</td> <td>2.124E+00</td> <td>3.083E-05</td> <td>1.180E-01</td> <td>1.180E-01</td>		00+	NM (a)	1.463E-02	4.682E-03	2.124E+00	3.083E-05	1.180E-01	1.180E-01
Interview Interview <t< td=""><td></td><td>105</td><td>NM (a)</td><td>ND 4 6425 07</td><td>1 454E 07</td><td>ND S FOAE OF</td><td>ND 45</td><td>QN COLLEGE</td><td>GN</td></t<>		105	NM (a)	ND 4 6425 07	1 454E 07	ND S FOAE OF	ND 45	QN COLLEGE	GN
4.470E-04 NM (a) 3.260E-06 1.043E-06 4.732E-04 6.870E-09 2.629E-05 J.385E-03 NM (a) 2.469E-05 7.901E-06 3.584E-03 5.202E-08 1.991E-04 J.586E-03 NM (a) 1.157E-05 3.703E-06 1.680E-03 2.438E-08 9.331E-05 See 1.250E-02 NM (a) 1.063E-01 3.401E-02 1.543E+01 2.240E-04 8.571E-01 see 1.250E-02 NM (a) 1.757E-05 2.918E-05 1.324E-02 1.921E-07 7.354E-04 rus 1.665E-03 NM (a) 1.257E-05 3.807E-06 1.543E+01 2.540E-04 8.571E-01 rus 1.665E-03 NM (a) 1.257E-05 3.807E-05 1.763E-03 1.417E-05 rus ND ND ND ND ND ND ND n ND NM (a) 1.986E-05 7.861E-08 2.882E-02 4.184E-07 1.601E-08 n 1.506E-05 NM (a) 1.998E-05 3.515E-06 4.184E-07<		-03	NM (a)	8 785F-06	2.811E-06	1.275F-03	1.851F-08	7.084E-05	3.003E-00
3.385E-03 NM (a) 2.469E-05 7.901E-06 3.584E-03 5.202E-08 1.991E-04 um 1.586E-03 NM (a) 1.157E-05 3.703E-06 1.680E-03 2.438E-08 9.331E-05 se 1.457E+01 NM (a) 1.063E-01 3.401E-02 1.543E+01 2.240E-04 8.571E-01 se 2.2409E-04 NM (a) 1.719E-05 2.918E-05 1.324E-02 1.921E-07 7.354E-04 rus 1.665E-03 NM (a) 1.757E-06 5.622E-07 2.550E-04 3.702E-09 9.795E-05 n ND ND ND ND ND ND ND n ND NM (a) 1.215E-05 7.861E-08 3.566E-05 5.176E-10 1.981E-06 n ND ND ND ND ND ND ND n ND NM 1.986E-05 2.882E-02 4.184E-07 1.601E-03 1.506E-05 NM 1.595E-05 2.315E-10 8.861E-07		-04	NM (a)	3.260E-06	1.043E-06	4.732E-04	6.870E-09	2.629E-05	2.629E-05
Image: Line Beeler of the Beeler of		5-03	NM (a)	2.469E-05	7.901E-06	3.584E-03	5.202E-08	1.991E-04	1.991E-04
Jum 1.457E+01 NM (a) 1.063E-01 3.401E-02 1.543E+01 2.240E-04 8.571E-01 Ste 1.250E-02 NM (a) 9.19E-05 2.918E-05 1.324E-02 1.921E-07 7.354E-04 7.354E-04 Tus 2.409E-04 NM (a) 1.757E-06 5.622E-07 2.550E-04 3.702E-09 1.417E-05 Tus ND NM (a) 1.215E-05 3.887E-06 1.763E-03 2.559E-08 9.795E-05 N ND NM NM (a) 1.215E-05 7.861E-08 3.566E-05 5.176E-10 1.981E-05 N ND ND ND ND ND ND ND N NM NM (a) 1.986E-07 7.861E-08 2.882E-02 4.184E-07 1.601E-03 1.506E-05 NM (a) 1.099E-07 3.516E-06 2.315E-10 8.861E-07		€-03	NM (a)	1.157E-05	3.703E-06	1.680E-03	2.438E-08	9.331E-05	9.331E-05
sse 1,250E-02 NM (a) 9,119E-05 2,918E-05 1,324E-02 1,921E-07 7,354E-04 rus 2,409E-04 NM (a) 1,757E-06 5,622E-07 2,550E-04 3,702E-09 1,417E-05 rus 1,665E-03 NM (a) 1,215E-05 3,887E-06 1,763E-03 2,558E-08 9,795E-05 n ND NM NM (a) 2,456E-07 7,861E-08 3,566E-05 5,176E-10 1,991E-06 ND NM NM (a) 1,986E-07 NB ND ND ND 2,722E-02 NM (a) 1,986E-04 6,354E-05 2,315E-10 4,184E-07 1,601E-03 1,506E-05 NM (a) 1,099E-07 3,516E-08 1,595E-05 2,315E-10 8,861E-07		101	NM (a)	1.063E-01	3.401E-02	1.543E+01	2.240E-04	8.571E-01	8.571E-01
1.75FE-06 5.622E-07 2.550E-04 3.702E-09 1.417E-05 1.085E-03 NM(a) 1.215E-05 3.887E-06 1.763E-03 2.558E-08 9,795E-05 1.085E-03 NM(a) ND ND ND ND ND NM(a) 1.986E-07 7.861E-08 3.566E-05 5.176E-10 1.981E-06 1.506E-05 NM(a) 1.986E-04 6.354E-05 2.882E-02 4.184E-07 1.601E-03 1.506E-05 NM(a) 1.099E-07 3.516E-08 1.595E-05 2.315E-10 8.861E-07	nese	5-02	NM (a)	9.119E-05	2.918E-05	1.324E-02	1.921E-07	7.354E-04	7.354E-04
rus 1,665E-03 NM (a) 1,215E-05 3.887E-06 1,763E-03 2,558E-08 9,795E-05 n ND NM NM (a) 2,456E-07 7,861E-08 3,566E-05 5,176E-10 1,981E-06 1,981E-06 ND NM NM NM NM NM ND		€-04	NM (a)	1.757E-06	5.622E-07	2.550E-04	3.702E-09	1.417E-05	1.417E-05
ND NM (a) NM (b) NM (c) 2.456E-07 7.861E-08 3.566E-05 5.176E-10 1.981E-06 1.981E-06 ND NM (c)		E-03	NM (a)	1.215E-05	3.887E-06	1.763E-03	2.559E-08	9.795E-05	9.795E-05
3.368E-05 NM (a) 2.456E-07 7.861E-08 3.566E-05 5.176E-10 1.981E-06 ND NM NM <t< td=""><td>nm</td><td></td><td>NM (a)</td><td>QN</td><td>QN</td><td>QN .</td><td>Q</td><td>QN</td><td>QN</td></t<>	nm		NM (a)	QN	QN	QN .	Q	QN	QN
ND NM (a) ND		E-05	NM (a)	2.456E-07	7.861E-08	3.566E-05	5.176E-10	1.981E-06	1.981E-06
2.722E-02 NM (a) 1.986E-04 6.354E-05 2.882E-02 4.184E-07 1.601E-03 1.506E-05 NM (a) 1.099E-07 3.516E-08 1.595E-05 2.315E-10 8.861E-07	ium		NM (a)	2	QN	QN	QN	QN	QN
1.506E-05 NM (a) 1.099E-07 3.516E-08 1.595E-05 2.315E-10 8.861E-07		E-02	NM (a)	1.986E-04	6.354E-05	2.882E-02	4.184E-07	1.601E-03	1.601E-03
		5-05	NM (a)	1.099E-07	3.516E-08	1.595E-05	2.315E-10	8.861E-07	8.861E-07

NM = Not Measureable a: Insufficient material to analyze. b: HCI/Cl₂ levels were too tow to be reliably measured.

Table B-2: Air Modeling Output Data for Volatile Organic Compounds

		Signal Illun NEW,	Signal Illumination M159 NEW, Ib = 0.32		Items per event (I) release duration (t):	1 18	item/event seconds	
		Number	Number of Items = 1		Unit Concentration (UC):	2.613E-04	g/m³/(g/s)	
Punodiuo	Measured Actual Concentration (mg/m³)	Measured Background Concentration (mg/m³)	Average Adjusted Emission Factor (Ib/Ib NEW)	Average Adjusted Emission Factor (toldem)	Total Mass of Pollulant Emitted (grams/item)	Pollurant Concentration 1 tem (trans.m.) CONC	Pollutant Emission Rate (g/sec)/lem ER,	Event Pollutant Emission Rate 1 Item (g/sec) ERE
Total Nonmethane Hydrocarbons (TNMHC)								
TNMHC	2.699E-01	1.640E-01	7.432E-04	2.378E-04	1.079E-01	1.566E-06	5.993E-03	5.993E-03
Volatile Organic Compounds (VOCs)								
Ethane	8.850E-03	1.300E-03	5.301E-05	1.696E-05	7.694E-03	1.117E-07	4.275E-04	4.275E-04
Ethylene	2.505E-02	2.000E-04	1.745E-04	5.583E-05	2.532E-02	3.676E-07	1.407E-03	1.407E-03
Acetylene	1.305E-02	4.000E-04	8.882E-05	2.842E-05	1.289E-02	1.871E-07	7.162E-04	7.162E-04
Propane	2.800E-03	1.000E-03	1.264E-05	4.044E-06	1.834E-03	2.663E-08	1.019E-04	1.019E-04
Propene	1.135E-02	1.000E-04	7.899E-05	2.528E-05	1.146E-02	1.664E-07	6.369E-04	6.369E-04
i-Butane	2.650E-03	3.100E-03	QN	QN	QN	Q	QN	QN
-Butene	1.300E-03	QN	9.127E-06	2.921E-06	1.325E-03	1.923E-08	7.360E-05	7.360E-05
1-Butene	2.100E-03	Q	1.474E-05	4.718E-06	2.140E-03	3.107E-08	1.189E-04	1.189E-04
1,3-Butadiene	2.200E-03	Q	1.545E-05	4.943E-06	2.242E-03	3.255E-08	1.246E-04	1.246E-04
n-Butane	1.200E-02	1.210E-02	QN	QN	QN	QN	QN	QN
trans-2-Butene	1.100E-03	2	7.723E-06	2.471E-06	1.121E-03	1.627E-08	6.228E-05	6.228E-05
2,2-Dimethylpropane	7.000E-04	2	4.915E-06	1.573E-06	7.134E-04	1.036E-08	3.963E-05	3.963E-05
cis-z-burene	5.500E-04		3.862E-06	1.230E-U0	5.505E-04	8.13/E-09	3.114E-05	3.114E-05
3-Methyl-1-butene	3.000E-04	ON S	2.106E-06	6.740E-07	3.05/E-04	4.438E-09	1.698E-05	1.698E-05
-Pentane	2.330E-02	2.490E-02	ON ON THE	ND ND	ON O	ON O	ON OF	ON TOTAL
1-Pentene	2.000E-04	2 2	1.404E-06	4.493E-07	Z.038E-04	2.959E-09	1.132E-U5	1.13ZE-05
Z-Methyl-1-butene	2.000E-04	1 720E-02	1.404E-00	4.493E-07	2.030E-04	4.339E-09	1.132E-03	1.13ZE-03
Isoprene	ND ND	ND	QN	2	2 2	2	200	Q
trans-2-Pentene	1.500E-04	QN	1.053E-06	3.370E-07	1.529E-04	2.219E-09	8.492E-06	8.492E-06
cis-2-Pentene	2.000E-04	QN	1.404E-06	4.493E-07	2.038E-04	2.959E-09	1.132E-05	1.132E-05
2-Methyl-2-butene	3.000E-04	QN	2.106E-06	6.740E-07	3.057E-04	4.438E-09	1.698E-05	1.698E-05
2,2-Dimethylbutane	1.350E-03	1.500E-03	ON TOTO	ON COLOR	QN COLOR	ON COLOR	ON O	ON O 1997 S
4-Methyl-1-pentene	ND ON	2 2	ND ND	ND ND	ND ND	ND ND	0.492E-00	0.492E-00
Cyclopentane	9.000E-04	8.000E-04	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
2,3-Dimethylbutane	1.900E-03	2.000E-03	Q	QN	QN	QN	QN	QN
cis-4-Methyl-2-pentene	QN	QN	QN	QN	ND	ND	QN	ND
2-Methylpentane	7.350E-03	7.700E-03	QN	QN	QN	QN	QN	ND
3-Methylpentane	4.850E-03	4.600E-03	1.755E-06	5.617E-07	2.548E-04	3.698E-09	1,415E-05	1.415E-05
2-Methyl-1-pentene	Q	Q	Q.	QN	QN	QN	QN	QN
1-Hexene	2.500E-04	QN	1.755E-06	5.617E-07	2.548E-04	3.698E-09	1.415E-05	1.415E-05
n-Hexane	6.750E-03	7.000E-03	Q	Q	QN	QV	QN	QN
trans-2-Hexene	Q	Q	QN	Q	QN	Q	Q	QN
2-Methyl-2-pentene	Q	Q	QN	QN	QN	Q	Q.	Q
cis-2-Hexene	Q	QN	QN	Q	QN	Q	QN	Q
Methylcyclopentane	2.300E-03	2.100E-03	1.404E-06	4.493E-07	2.038E-04	2.959E-09	1.132E-05	1.132E-05
2,4-Dimethylpentane	7.000E-04	7.000E-04	Q	Q	QN	Q	QN	Q





Benzene Cyclohexane	Measured Actual Concentration (mg/m³)	Measured Background Concentration (mg/m³)	Average Adjusted Emission Factor (Ib/Ib NEW)	Average Adjusted Emission Factor (Ib/item)	Total Mass of Pollutant Emitted (grams/item)	Pollutant Concentration 1 ttem (grams/m³)	Pollutant Emission Rate (g/sec/ritem	Ewe
Benzene Cyclohexane					2	CONC	ER,	ERev
Cyclohexane	1.145E-02	4.000E-03	5.231E-05	1.674E-05	7.592E-03	1.102E-07	4.218E-04	4.218E-04
	1.150E-03	2.000E-03	QN	2	QN	Q	QN	Q
2-Methylhexane	2.000E-03	1.900E-03	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
2,3-Dimethyipentane	1.100E-03	1.100E-03	QN	Q	ON	Q	QN	QN
3-Methylhexane	2.150E-03	2.300E-03	QN	2	QN	QV	Q	Q
2,2,4-Trimethylpentane	2.850E-03	2.700E-03	1.053E-06	3.370E-07	1.529E-04	2.219E-09	8.492E-06	8.492E-06
n-Heptane	2.200E-03	2.100E-03	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
2,4,4-Trimethyl-1-pentene	QN	ND	ND	QN	QN	QN	QN	QN
Methylcyclohexane	1.900E-03	1.900E-03	QN	QN	QN	QV	QN	QN
2,4,4-Trimethyl-2-pentene	Q	QN	QN	QN	QV	QV	QN	QN
2,5-Dimethylhexane	5.000E-04	4.000E-04	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
2,4-Dimethylhexane	6.000E-04	5.000E-04	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
2,3,4-Trimethylpentane	9.500E-04	8.000E-04	1.053E-06	3.370E-07	1.529E-04	2.219E-09	8.492E-06	8.492E-06
Toluene	1.145E-02	8.700E-03	1.931E-05	6.179E-06	2.803E-03	4.068E-08	1.557E-04	1.557E-04
2,3-Dimethylhexane	QN	3.000E-04	QN	QN	QN	S	Q	QN
2-Methylheptane	5.000E-04	4.000E-04	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
3-Ethylhexane	4.000E-04	4.000E-04	QN	QN	QN	QN	QN	9
2,2-Dimethylheptane	QN	QN	QN	QN	QN	Q.	QN	QN
2,2,4-Trimethylhexane	QN	QN	QN	QN	QN	9	QN	QN
n-Octane	6.500E-04	4.000E-04	1.755E-06	5.617E-07	2.548E-04	3.698E-09	1.415E-05	1.415E-05
Ethylcyclohexane	QN	QN	QN	QN	QN	QN	QN	QN
Ethylbenzene	3.600E-03	2.600E-03	7.021E-06	2.247E-06	1.019E-03	1.479E-08	5.662E-05	5.662E-05
m-Xylene & p-Xylene	1.610E-02	1.320E-02	2.036E-05	6.516E-06	2.955E-03	4.290E-08	1.642E-04	1.642E-04
Styrene	7.000E-04	QN	4.915E-06	1.573E-06	7.134E-04	1.036E-08	3.963E-05	3.963E-05
o-Xylene	5.500E-03	4.900E-03	4.213E-06	1.348E-06	6.115E-04	8.876E-09	3.397E-05	3.397E-05
n-Nonane	5.500E-04	1.000E-04	3.159E-06	1.011E-06	4.586E-04	6.657E-09	2.548E-05	2.548E-05
i-Propylbenzene	QN		QN	QN	QN	ND	QN	QN
n-Propylbenzene	3.000E-04	2.000E-04	7.021E-07	2.247E-07	1.019E-04	1.479E-09	5.662E-06	5.662E-06
p-Ethyltoluene	1.050E-03	7.000E-04	2.457E-06	7.864E-07	3.567E-04	5.178E-09	1.982E-05	1.982E-05
in-cinyionene	4.300E-04	3.000E-04	1.053E-06	3.370E-07	1.529E-04	2.219E-09	8.492E-06	8.492E-06
1,3,5-1 miletriyibenzene o-Ethylphiene	3.000E-04	2.000E-04	7.021E-07	2.24/E-0/	1.019E-04	1.4/9E-09	5.662E-06 5.662E-06	5.662E-06
1,2,4-Trimethylbenzene & sec-Butylbenzene	1.200E-03	1.000E-03	1.404E-06	4.493E-07	2.038E-04	2.959E-09	1.132F-05	1 132F-05
n-Decane	2.000E-04	2.000E-04	QN	QN	QN	QN	QN	QN
alpha-Pinene	QN	QN	QN	QN	QN	ND	QN	Q.
beta-Pinene	QN	QN	QN	QN	ON	QN	QN	ND
delta 3-Carene	QN	QN	Q	QN	QN.	QN	QN	ON
d-Limonene	QN	QN	Q	QN	QN	QN	QN	ND
MTBE	4.350E-03	4.900E-03	Q	QN	QN	QN	QN	QN
Dichlorodifluoromethane	1.896E-03	1.889E-03	4.819E-08	1.542E-08	6.995E-06	1.015E-10	3.886E-07	3.886E-07
Methylchloride	2	QN	Q	Q	QN.	QN	QN	QN
Dichlorotetrafluoroethane	Q.	Q	Q	QN	Q	QN	QN	ND
Chloroethene	2	QN	QN	Q	Q	ND	Q	S
1,3-Butadlene	2.238E-03	ON	1.571E-05	5.027E-06	2.280E-03	3.310E-08	1.267E-04	1.267E-04
Methylbromide	Q.	Q.	Q.	Q	QN	QN	QN	QN
Effylchlonde	QN	QN	QN	Q	Q	QN	QN	QN
richloromanonanane	Z.69ZE-U3	2.575E-03	8.218E-07	2.630E-07	1.193E-04	1.732E-09	6.627E-06	6.627E-06

Table B-2: Air Modeling Output Data for Volatile Organic Compounds

	Concentration (mg/m²)	Background Concentration (mg/m²)	Average Adjusted Emission Factor (Ib/Ib NEW)	Average Adjusted Emission Factor (Ib/tem)	Total Mass of Pollutant Emitted (grams/item) M	Pollutant Concentration 1 flem (grams/m²) CONC	Pollutant Emission Rate (g/sec)/item ER,	Emission Rate 1 (p/sec) (Rev
Vinylidenechloride	QN	QN	QN	QN	ND	QN	QN	QN
Methylenechloride	9.062E-03	8.672E-04	5.754E-05	1.841E-05	8.351E-03	1.212E-07	4.640E-04	4.640E-04
Allylchloride	QN	QN	QN	QN	QN	QN	QN	QN
1,1,2-Trichloro-1,2,2-trifluoroethane	9.182E-04	8.816E-04	2.573E-07	8.235E-08	3.735E-05	5.422E-10	2.075E-06	2.075E-06
1,1-Dichloroethane	Q	Q	Q	Q	QN	2	9	Q
1,2-Dichloroethene	Q	Q	QN :	Q :	QN .	Q.	2	Q :
Chloroform	2	S	2	ON S	ON ST	Q I	2	Q C
1,2-Dichloroethane	QN	Q	QN	QN.	QN	QN	ON.	QN
Methylchloroform	3.328E-04	3.145E-04	1.286E-07	4.116E-08	1.867E-05	2.710E-10	1.037E-06	1.037E-06
Benzene	1.165E-02	4.068E-03	5.320E-05	1.702E-05	7.722E-03	1.121E-07	4.290E-04	4.290E-04
Larbontetrachioride 4 3 Disklamman	7.91ZE-04	7.436E-04	3.345E-U/	1.070E-07	4.855E-U5	7.047E-10	Z.69/E-06	2.69/E-06
T. Z. DICHIOTOPIOPANE	2 2	2 2	2 2	2 2		ON CA	2	2 5
richioroemylene	2 2	2 2	2 2	2 2		ON CA	2 2	2 2
dis 1,3-Dicilio10-1-ploperie	2 2	2 2		2	QN S	N N	2 2	2 2
idata i,o-Dicilioto-i-piopetie	GN C	Q S	2		2	2	Q.	ON C
1,1,2-1 richioroethane	ND V	ND 8 8 4 0 T 0 S	ND 4	ON O	ND Openio	UN TOOL Y	UN TO TA	ON COAT OF
rouene	1.165E-02	8.849E-03	1.964E-U5	6.284E-Ub	Z.850E-03	4.138E-08	1.584E-04	1.584E-04
1,Z-Uibromoemane	ON S	2	2	2 2	ON I	Q.	ON C	2 9
Perchloroethylene	2	2	2	ON S	ON I	Q	2	ON S
Chrorobenzene	UND	ND SOOP	A OZOT OF	2.440F 06	ND 4 EEET 03	ND OTAT OF	UND OF OF	ON OF
Ethylpenzene - 8 - V-d	5.527E-03	3.99ZE-U3	1.078E-05	3.449E-U0	1.565E-03	2.2/1E-08	8.69ZE-U5	8.692E-05
mop-Aylene Street	1.038E-02	1.343E-02	4.000F.06	0.027E-U0	3.006E-03	4.304E-08	1.6/UE-04	1.67.0E-04
Styrene 4.1.2.2 Tetrachlomethane	7.120E-04	2 5	4.999E-00	1.50UE+U0	1.236E-04	1.053E-08	4.031E-05	4.031E-05
- Xvlone	5 504E 03	A ORAE OR	A 285E OR	4 274E-08	8 240E-04	00 2850 0	3 4555 05	2 4 EEE OE
n-Ethyltoliene	1 068E-03	7 120E-04	4.263E-00	7 008E-07	3 628E-04	5.020E-03	3.433E-03	3.453E-03
1.3.5.Trimethylbenzene	5.086E-04	4 068F-04	7 141F-07	2.285E-07	1.037F-04	1.505F-09	5 759E-06	5.759E-06
1.2.4-Trimethylbenzene	1.221E-03	1.017E-03	1.428E-06	4.570E-07	2.073E-04	3.009E-09	1.152F-05	1.152F-05
Benzylchloride	Q	Q	QN	QN	9	2	Q	QN
m-Dichlorobenzene	QN	QN	QN	QN	QN	QN	QN	QN
p-Dichlorobenzene	QN	QN	QN	QN	QN	ND	QN	QN
o-Dichlorobenzene	QN	QN	QN	QN	QN	QV	QN	QN
1,2,4-Trichlorobenzene	2	2	Q	QN	Q	QV.	Q	Q
Hexachlorobutadiene	QN	Q	Q.	Q	QN	Q	Q	QV
trans-1,2-Dichloroethene	9	2	2	Q.	Q.	2	Q	Q
o-Chlorotoluene	QN .	Q !	Q.	Q.	QN	Q	Q	Q.
p-Chlorotoluene	Q.	2	2	Q	Q	QN	Q	Q
1,3,5-Trichlorobenzene	QN	Q.	Q.	2	QN !	Q	QN !	Q.
1,2,3-Trichlorobenzene	Q	Q	QN	Q	QN	Q	Q	Q
Methylnitrite	2.142E-03	S	1.504E-05	4.813E-06	2.183E-03	3.169E-08	1.213E-04	1.213E-04
Acetonitrile	4.369E-04	Q	3.068E-06	9.817E-07	4.453E-04	6.464E-09	2.474E-05	2.474E-05
Acrylonitrile	4.070E-04	Q	2.857E-06	9.144E-07	4.148E-04	6.021E-09	2.304E-05	2.304E-05
Nitromethane	1.813E-03	Q	1.273E-05	4.074E-06	1.848E-03	2.683E-08	1.027E-04	1.027E-04
Benzonitrile	5.405E-04	2.804E-04	1.826E-06	5.844E-07	2.651E-04	3.848E-09	1.473E-05	1.473E-05
Nitrobenzene	Q	QN	QN	QN	QN	Q	Q	ND
Carbonyl Sulfide	1.596E-04	Q	1.120E-06	3.585E-07	1.626E-04	2.360E-09	9.033E-06	9.033E-06
Sulfur Dioxide	QN	QN	QN	QN	QN	QN	QN	QN





	Monthly Actual	Measured	A Comment		Total Mass of Pollutant	Pollutant	Polfutant Emission	• Event Pollutant
Compound	Concentration (ma/m³)	Background Concentration	Emission Factor (Ib/Ib NEW)	Emission Factor (Ib/Item)	Emitted (grams/fem)	Concentration 1 item (grams/m³)	Rate (g/sec)/item	Item (d/sec)
		(mg/m²)			Σ	CONC	ER,	ERev
Carbon Disulfide	6.511E-03	1.072E-03	3.819E-05	1.222E-05	5.543E-03	8.047E-08	3.080E-04	3.080E-04
Thiophene	5.269E-04	4.412E-04	6.016E-07	1.925E-07	8.732E-05	1.268E-09	4.851E-06	4.851E-06
Dimethyldisulfide	Q	Q	2	QN	QN	ND	QN	Q
2-Methylthiophene	QN	Q	QN N	QN	QN	QN	2	Q
3-Methylthiophene	QN	Q	Q	QN	ND	QN	QN	ON
Dimethyltrisulfide	Q	Q	QN	QN	QN	ON	QN	QN
Isothiocyanatomethane	QN	QN	QN	QN	QN	QN	QN	QN
2-Chlorothiophene	Q	QN	QN	QN	QN	QN	QN	QN
3-Chlorothiophene	QN	QN	QN	QN	QN	ND	QN	QN
2-Thiophenecarboxaldehyde	QN	QN	QN	QN	QN	ND	QN	QN
Naphthalene	1.115E-03	Q	7.829E-06	2.505E-06	1.136E-03	1.650E-08	6.313E-05	6.313E-05
Acetaldehyde	3.979E-04	9.884E-05	2.100E-06	6.720E-07	3.048E-04	4.425E-09	1.693E-05	1.693E-05
Acrolein	1.508E-03		1.058E-05	3.387E-06	1.536E-03	2.230E-08	8.535E-05	8.535E-05
Acetone	1.394E-02	9.491E-03	3.121E-05	9.987E-06	4.530E-03	6.576E-08	2.517E-04	2.517E-04
Propanal	1.004E-03	QN !	7.046E-06	2.255E-06	1.023E-03	1.485E-08	5.682E-05	5.682E-05
Furan	2.278E-03	Q	1.599E-05	5.117E-06	2.321E-03	3.369E-08	1.289E-04	1.289E-04
2-Propanol	Q	1.295E-04	2	Q	QN	ND	QN	Q
2-Methylpropanal	2	Q	Q	QV	QN	ND	QN	QN
Methacrolein	Q.	QN	2	QN	QN	ND	QN	Q
2,3-Butanedione	9	QN	Q	QN	QN	QN	QN	QN
Methyl-Vinyl Ketone	Q.	Q	2	QN	QN	ND	QN	Q
MTBE	6.001E-03	6.416E-03	2	Q	QV	ND	QN	Q
Butanal	7.922E-04	9.333E-04	Q	QN	QN	QV	QN	Q
2-Butanone	2.059E-03	8.352E-04	8.589E-06	2.749E-06	1.247E-03	1.810E-08	6.926E-05	6.926E-05
l etranydroruran	4.129E-04	1.96/E-04	1.518E-06	4.85/E-0/	2.203E-04	3.198E-09	1.224E-05	1.224E-05
z-Metnyl-1-propanoi	Q S		Q S	QN .	QN	QN	QN	Q
trans-z-butenai	ND SAGE OA	1 251E 03	2 2	2 2	QN S	Q	2	Q G
2-Pentanone	3 767E-03	ND AN	2 645E-05	AR3E OR	2 820E 02	ND E 2705 00	ND 0.425F 0.4	NO COLO
Pentanal	1.887E-03	1.689E-03	1.385E-06	4.431E-07	2.010E-04	2.918E-09	1 117F-05	1 1175-05
4-Methyl-2-pentanone	QN	QN	QN	QN	QN	QN	QN	QN
trans-2-Pentenal	QN	QN	QN	QN	QN	QN	QN	QN
Cyclopentanone	6.562E-04	QN	4.608E-06	1.474E-06	6.688E-04	9.708E-09	3.715E-05	3.715E-05
2-Hexanone	QN	Q	QN	QN	QN	QN	QN	QN
Hexanal	4.172E-04	4.893E-04	QN	QN	QN	QN	QN	QN
3-Furaldehyde	2.004E-04	Q.	1.407E-06	4.503E-07	2.043E-04	2.965E-09	1.135E-05	1.135E-05
Butyl Acetate	6.487E-04	ON OF STATE OF	4.555E-06	1.457E-06	6.611E-04	9.597E-09	3.673E-05	3.673E-05
z-ruraidenyde	3.987E-U3	2.62/E-03	9.549E-06	3.056E-06	1.386E-03	2.012E-08	7.700E-05	7.700E-05
trans-2-Hexenal	Q S		QV.	QN S	Q.	Q	QN	QN
1-Hexanol	ND NO.	ON O	ON SE	ON .	ON	QV	QN	QN
o-neplanone	4.310E-04	4.240E-04	4.49/E-08	1.439E-08	6.528E-06	9.476E-11	3.626E-07	3.626E-07
z-Heptanone	ON C	ON	ON I	QN	Q	Q	QN	QN
Нертапа	5.936E-04	5.002E-04	6.561E-07	2.099E-07	9.523E-05	1.382E-09	5.290E-06	5.290E-06
trans-2-Heptenal	2	Q	Q	QN	QN	ND	Q	QN
5-Metnyi-2-turaldenyde		ON S	Q.	Q :	QN	Q	QN	QN
b-metnyl-z-neptanone	UND V	ND ATTE	ON 1920 S	ON	QN C	QN	QN	QN
Delizaldeliyde	1.707 E-03	7.334E-04	0.079E-00	Z.13/E-Ub	9.694E-04	1.40/E-08	5.385E-05	5.385E-05

Table B-2: Air Modeling Output Data for Volatile Organic Compounds

Compound	Measured Actual Concentration (mg/m²)	Measured Background Concentration (mg/m³)	Average Adjusted Emission Factor (tibrib NEW)	verage Adjusted Average Adjusted Emission Factor Emission Factor (Ib/Ib NEW) (Ib/Item)	Total Mass of Pollutant Emitted (grams/flem) M	Polititant Concentration 1 Item (grams/m²) CONC	Pollutant Emission Rate (9/sec)/item ER,	Event Pollutant Emission Rate 1 Item (g/sec) ER _{EV}
1-Heptanol	QN	QN	QN	QN	QN	QN	QN	ND
6-Methyl-5-hepten-2-one	QN	QN	QN	QN	QN	QV	Q	QN
2-Octanone	QN	QN	QN	QN	QN	QV	QN	QN
Octanal	1.279E-03	1.005E-03	1.922E-06	6.151E-07	2.790E-04	4.050E-09	1.550E-05	1.550E-05
Benzofuran	8.043E-04	QN	5.647E-06	1.807E-06	8.196E-04	1.190E-08	4.554E-05	4.554E-05
trans-2-Octenal	QN	ND	QN	QN	QN	QN	QN	QN
Acetophenone	6.273E-04	ND	4.404E-06	1.409E-06	6.392E-04	9.280E-09	3.551E-05	3.551E-05
2-Nonanone	QN	QN	QN	QN	QN	QN	QN	QN
Nonanal	1.569E-03	1.295E-03	1.925E-06	6.160E-07	2.794E-04	4.056E-09	1.552E-05	1.552E-05
trans-2-Nonenal	Q	ND	QN	ND	QN	QN.	Q	S
2-Decanone	ND	ND	QN	QN	QN	QV	QN	QN
Decanal	8.539E-04	ND	5.996E-06	1.91858E-06	8.703E-04	1.263E-08	4.835E-05	4.835E-05
Footnotes:								

a: Items in bold represent duplicate values for those compounds that are common for Method TO-14 and TO-12.

abel B-3: Air Modeling Oupout Data for Semi-Volatile Organic Compounds

		Signal Illumination M159	ution M159		Items ner event (III		1 item/event	
		NEW, Ib = 0.32	= 0.32		release duration (t):	18	seconds	
		Number of Items =	lems = 1		Unit Concentration (UC):	2.613E-04	g/m^3/(g/s)	
Compound	Measured Actual Concentration (mg/m³)	Measured Background Concentration (mg/m³)	Average Adjusted Emission Factor (Ib/Ib NEW)	Average Adjusted Emission Factor (lb/item)	Total Mass of Pollutant Emitted (grams/item)	Pollutant Concentration 1 Item (grams/m³)	Pollutant Emission Rate (g/sec)/item ER,	• Event Pollutant Emission Rafe 1 Item (g/sec) ERev
Particulate/Vapor-phase SVOCs								3
N-Nitrosodimethylamine	QN	QN	QN	QN	QN	ND	Q	ON.
Pyridine	QN	QN	QN	QN	QN	ND	QN	QN
2-Picoline	QN	QN	QN	QN	QN	QN	QN	QN
Methyl methanesulfonate	QN	QN	QN	Q	QN	QN	QN	QN
N-Nitrosomethylethylamine	QN	ON	QN	QN	QN	ND	QN	QN
N-Nitrosodiethylamine	QN	Q	QN	QN	QN	QN	QN	QN
Ethyl methanesulfonate	ΝD	Q	QN	QN	QN	QN	QN	QN
Phenol	QN	Q	Q	QN	QN	Q	QN	QN
Aniline	ND	QN	QN	QN	QN	QN	QN	ON
bis(2-Chloroethyl)ether	QN	QN	QN	QN	ND	QN	QN	QN
Pentachloroethane	QN	QN	QN	QN	QN	QN	QN	QN
2-Chlorophenol	QN	QN	QN	QN	QN	QN	QN	QN
1,3-Dichlorobenzene	QN	QN	QN	QN	QN	QN	QN	QN
1,4-Dichlorobenzene	S	QN	Q	QN	QN	Q	S	QN
Benzyl alcohol	Q	QN	QN	QN	Q	QN	QN	QN
2-Methylphenol	Q	QN	QN	QN	QN	Q	QN	QN
1,2-Dichlorobenzene	QN	QN	QN	QN	QN	Q	QN	QN
bis(2-Chloroisopropyl)ether	Q	Q	QN	Q	QN	Q	QN	QN
o-Toluidine	ND	Q	QN	QN	QN	QN	Q	QN
4-Methylphenol/3-Methylphenol	Q	Q	QN	QN	QN	Q	QN	QN
N-Nitroso-di-n-propylamine	QN	QN	QN	QN	QN	QN	QN	QN
Acetophenone	4.590E-04	1.852E-04	2.097E-06	6.710E-07	3.043E-04	4.418E-09	1.691E-05	1.691E-05
N-Nitrosomorpholine	Q (QN	QN S	Q.	QN	2	Q.	QN
N-Nitrosopyrrolidine	ON S		Q.	QN.	ON	QN !	QN S	QN.
Hexachioroethane	2 2	2 2		2 2	ON CIV	Q V	2 2	ON ON
N-Nitrosopheridine	2 2	S	CN	S	S S	GN CN	CN CN	Q Q
Isophorone	QN	QN	QN	QN	QV	QN	Q	QN
2,4-Dimethylphenol	ON	QN	QN	QN	QN	ND	QN	QN
2-Nitrophenol	QN	QN	QN	QN	QN	ON	QN	ND
bis(2-Chloroethoxy)methane	Q.	Q	Q	Q	QN	QV	QN	ND
Benzoic acid	QN	2.607E-03	QN	Q	QN	Q.	QN	QN
2,4-Dichlorophenol	QN	QN	QN	QN	QN	QN	QN	ND
1,2,4-Trichlorobenzene	QN	QN	Q	QN	QN	QN	QN	QN
Naphthalene	3.993E-04	QN	3.058E-06	9.787E-07	4.439E-04	6.444E-09	2.466E-05	2.466E-05
p-Chloroaniline	Q.	Q	Q	Q	QN	QN	Q	QN
2,6-Dichlorophenol	QN	QN	Q	2	QN	QN	Q	QN
Hexachloropropene	Q.	2	9	2	2	QN	2	Q
Hexachiorobutadiene	ON SE	2 2	2 2	2		2	ON S	ON.
Dimethylphenethylamine	ON G	2 5	2 2		ON I	QN C	Q	Q
N-INITIOSO-UI-II-DAITIIIIG	UNI	NO	NO	UND	ממ	5	NU	NU

Tabel B-3: Air Modeling Oupout Data for Semi-Volatile Organic Compounds

4-Chloro-3-methylphenol ND Safrole ND 2-Methylnaphthalene ND 1.2.4.5-Tetrachlorobenzene ND Hexachlorocyclopentadiene ND 2.4.5-Trichlorophenol ND Sossafrole ND 2-Chironaphthalene ND 2-Chironaphthalene ND 2-Chironaphthalene ND 2-Chironaphthalate ND 1.4-Naphthoduinone ND 2-Chiritrophine ND 2-Chiritrophine ND 2-Chiritrophine ND 2-A-Diritrophine ND 2-A-Diritrophenol ND A-Mirophenol ND 2-A-Diritrophenol ND 2-A-Diritrophenol ND 2-A-Diritrophenol ND Dibenzofuran ND Pentachlorobenzene ND		200	21 th 1800 600 10 months 1 1 1 1 1 1	Factor (Ib/item)	(grams/ltem) M	(Grams/m) CONC	R	(g/sec) ER _{EV}
diene		Q Q	QN	ON	QN	Q	QN	QN
rzene idiene		QN	ND	QN	ND	QN	QN	QN
diene			QN	QN	QN	QN	ND	QN
diene		QN	Q	Q	ND	Q	QN	QN
		Q	Q	QN	ND	QN	QN	QN
		QV	ND	2	ND	QN	QN	QN
		QN	QN	QN	QN	ON	QN	QN
		QN	QN	ON	QN	QN	QN	QN
eu eu		ND	QN	QN	QN	QN	QN	QN
eu eu		Q	Q	QN	ON	ON	QN	QN
eu		Q	QN	Q	QN	ON	QN	QN
Izene Iene Inene I		QN	QN	QN	QN	QN	QN	QN
ne ne nol e	<u> </u>	ND	ND	QN	QN	QN	QN	QN
ne anol e lenzene		UD	QN	QN	QN	QN	QN	QN
anol e Jene enzene		ND	QN	QN	QN	QN	Q	Q
enzene		QN	ND	QN	ON	QN	S	QN
anol bus lens lens lense		QN	ND	QN	QN	QN	QN	QN
enzene		. ON	QN	QN	QN	QN	QN	QV
Jene		QN	QN	QN	QN	QN	QN	QN
enzene		QN	ND	ND	QN	QN	QN	QN
		QN	ND	QN	QN	QN	QN	QN
		QN	ND	QN	GN	QN	QN	QN
		ND	QN	QN	QN	QN	QN	QN
		Q	QN	QN	QN	QN	QN	QN
prophenol		Q	ND	QN	QN	Q	ND	ON
8.0	40	Q	6.196E-06	1.983E-06	8.994E-04	1.306E-08	4.996E-05	4.996E-05
4-Chlorophenylether ND		QN	QN	QN	QN	QN	QN	QN
	+	2	2	Q	9	2	Q	QN
ON Google On Contract of the C	+		2 2	ON S	QN S	Q.	Q	QN
	1	2	ON S	2	ON S	2	QN	QN
ON O		2 2	2 2	2 2		2 9	2 2	Q C
svm-Trinitrobenzene	-	C N	2 2	2 2	Q. CN	2 2		ON ON
		QN	Q.	2	QN	2	Q	S
		QN	QN	QN	QN	Q.	Q	QN
yl ether		QN	QN	ON	ON	QN	8	QN
ane		QN	QN	QN	QN	QN	ND	QN
henyl		Q	Q	QN	QN	QN	QN	QN
		Q	Q	Q	QN .	QN	QN	QN
	1	Q	QN	Q	ON	QN	QN	QN
robenzene		Q	Q	QN	ON	QN	QN	QN
Phenanthrene		Q.	Q	QN	ON	Q	QN	QN
0		Q	Q	Q	QN	QN	QV	QN
	+	ON	QN	Q	QN .	ΩN	QN	QN
0.1	+	2.302E-04	6.287E-06	2.012E-06	9.125E-04	1.325E-08	5.070E-05	5.070E-05
4-Nitroquinoline-1-oxide		Q.	QN	Q	QN	Q	QN	Q

abel B-3: Air Modeling Oupout Data for Semi-Volatile Organis Compounds

Compound	Measured Actual Concentration (mg/m³)	Measured Background Concentration (mg/m³)	Average Adjusted Emission Factor (Ib/Ib NEW)	Average Adjusted Emission Factor (lb/item)	Total Mass of Pollutant Emitted (grams/ilem) M	Pollutant Concentration 1 Item (grams/m²) CONC	Pollutant Emission Rate (g/sec/ritem ER,	* Event Pollutant Emission Rate 1 Item (g/sec) ER _{EV}
Fluoranthene	QN	QN	QN	QN	QN	QN	QN	QN
Benzidine	QN	QN	QN	QN	ND	QV	QN	QN
Pyrene	QN	QN	QN	QN	QN	QN	S	QN
p-Dimethylaminoazobenzene	QN	ON	ON	QN	ND	QN	QN	QN
Chlorobenzilate	QN	QN	QN	QN	QN	QN	QN	QN
Kepone	ND	QN	ON	QN.	ND	QN	QN	QN
Butylbenzylphthalate	5.228E-04	6.346E-04	QN	QN	QN	QN	QN	QN
3,3'-Dimethylbenzidine	ON	QN	QN	QN	QN	QV	QN	QN
2-Acetylaminofluorene	QN	QN	GN	QN	QN	QN	QN	QN
bis(2-Ethylhexyl)phthalate	2.796E-03	QN	2.142E-05	6.853E-06	3.109E-03	4.513E-08	1.727E-04	1.727E-04
3,3'-Dichlorobenzidine	QN	ON	QN	QN	QN	QN	QN	QN
Benz(a)anthracene	QN	QN	QN	QN	ND	QN	QN	QN
Chrysene	ON	QN	ON	QN	QN	QN	QN	QN
Di-n-octylphthalate	ON	1.953E-04	QN	QN	QN	QN	QV	QN
7,12-Dimethylbenz(a)anthracene	QN	QN	ND	QN	ND	QN	QN	QN
Benzo(b)fluoranthene	Q	ND	QN	ON.	ND	QN	QN	QN
Benzo(k)fluoranthene	QN	QN	ND	QN	ND	QN	ON	QN
Benz(a)pyrene	Q	QN	QV	ON	ON	QN	QN	QV
3-Methylcholanthrene	QN	ON	QN	QN	QN	QN	QN	QN
Indeno(1,2,3-cd)pyrene	QN	QN	QN	ND	ON	QN	QN	QN
Dibenz(a,h)anthracene	QN	QN	ON	ND	ND	QN	QN	QN
Benzo(g,h,i)perylene	ND	ND	QN	QN	ND	QN	QN	QN
Footnotes: ND = Not Detected								

APPENDIX C

HEALTH-BASED SCREENING LEVELS AND ACUTE TOXICITY VALUES

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

			For the	For the Chronic Evaluation (HBSL	luation (HB	SL)	F	For the Acute Evaluation (ATV)	e Evaluati	on (ATV)
		Region 9	Toxicity	Ranion 3	Toxicity	Health.hased				Acute Toxicity
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	Screening Level	ERPG	匣	Source	Value
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(µg/m³)	(mg/m³)	(mg/m ₃)	(T or E)	(µg/m³)
TSP	12789-66-1	5.00E+01		AN		5.00E+01	ΑN	NA		
PM ₁₀		5.00E+01		NA		5.00E+01	NA	NA		
HCI	7647-01-0	2.08E+01	nc	2.08E+01	nc	2.08E+01	NA	7.14E+03	۲	7.14E+03
Cl ₂	7782-50-5	2.09E-01	nc	3.65E+02	nc	2.09E-01	2.89E+03	2.90E+03	ш	2.89E+03
Dioxin TEQ	1746-01-6	4.48E-08	υ	4.48E-08	၁	4.48E-08	NA	3.50E+00	_	3.50E+00
Carbon Monoxide (CO)	630-08-0	1.57E+02		NA		1.57E+02	2.30E+05	2.28E+05	ш	2.30E+05
Nitrogen Oxide (NOx)	10024-97-2	1.00E+02		NA		1.00E+02	.WA.	2.70E+05	T	2.70E+05
HCI (CEM System)	7647-01-0	2.08E+01	nc	2.08E+01	nc	2.08E+01	NA	7.14E+03	T	7.14E+03
Carbon Dioxide (CO ₂)	124-38-9	NA		NA		NA	AN	5.40E+07	⊢	5.40E+07
Sulfur Dioxide (SO ₂)	202-58-84	8.00E+01		NA		8.00E+01	7.89E+02	7.86E+02	Ш	7.89E+02
Aluminum	7429-90-5	NA		3.65E+00	nc	3.65E+00	AN	3.00E+04		3.00E+04
Antimony	7440-36-0	NA		1.46E+00	пс	1.46E+00	NA	1.50E+03		1.50E+03
Arsenic	7440-38-2	4.47E-04	ပ	4.15E-04	၁	4.47E-04	NA	3.00E+01		3.00E+01
Barium	7440-39-3	5.21E-01	nc	5.11E-01	nc	5.21E-01	NA	1.50E+03	T	1.50E+03
Beryllium	7440-41-7	8.00E-04	С	7.45E-04	С	8.00E-04	NA	5.00E+00	∸	5.00E+00
Cadmium	7440-43-9	1.07E-03	C	9.94E-04	C	1.07E-03	NA	3.00E+01	⊥	3.00E+01
Chromium	7440-43-9	Ϋ́	ပ	1.53E-04	ပ	1.53E-04	NA	1.50E+03		1.50E+03
Cobalt	7440-48-4	ΑΝ		2.20E+02	nc	2.20E+02	NA	6.00E+01		6.00E+01
Copper	7440-50-8	AA		1.46E+02	nc	1.46E+02	AA	3.00E+03	T	3.00E+03
Lead	7439-92-1	1.50E+00		NA		1.50E+00	ΑΝ	1.50E+02	Ţ	1.50E+02
Magnesium	7439-95-4	A A		۷A		NA	ΝΑ	3.00E+04	T	3.00E+04
Manganese	7439-96-5	5.11E-02	nc	5.22E-02	nc	5.11E-02	NA	3.00E+03	1	3.00E+03
Nickel	7440-02-0	AA		7.30E+01	nc	7.30E+01	ΑΝ	3.00E+03	_	3.00E+03
Phosphorus	7723-14-0	NA		NA		NA	NA	3.00E+02	_	3.00E+02
Selenium	7782-49-2	NA		1.83E+01	nc	1.83E+01	ΑΝ	6.00E+02	_	6.00E+02
Silver	7740-22-4	NA		1.83E+01	nc	1.83E+01	ΝΑ	3.00E+02	_	3.00E+02
Thallium	7440-28-0	NA		2.56E-01	nc	2.56E-01	NA	3.00E+02	_	3.00E+02
Zinc	7440-66-6	NA		1.10E+03	nc	1.10E+03	Ϋ́	3.00E+04	_	3.00E+04
Mercury	7439-97-6	3.13E-01	nc	3.14E-01	nc	3.13E-01	NA	1.00E+02	_	1.00E+02
TNMHC		NA		NA		NA	NA	ΝA		
Ethane	74-84-0	NA		Ϋ́		NA	NA	NA		
Ethylene	74-85-1	NA	•	Y V		NA	NA	4.60E+05	⊢	4.60E+05
Acetylene	74-86-2	NA		Y V		NA	NA	NA		
Propane	74-98-6	NA		NA		NA	AN	3.78E+06	Т	3.78E+06
Propene	115-07-1	A A		AN		NA	ΑN	NA		
i-Butane	106-97-8	NA		NA		NA	Ϋ́	5.71E+06	⊢	5.71E+06

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

			For the	Chronic Eva	Chronic Evaluation (HBSL	SL)	ĬĬ.	For the Acute Evaluation (ATV)	te Evaluat	ion (ATV)
Punodwog	CAS#	Region 9 PRG	Toxicity Endpoint	Region 3 RBC	Toxicity Endpoint	Health-based Screening Level	ERPG	Ē	Source	Acute Toxicity Value
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(fig/m²)	(µg/m³)	(µg/m³)	(TorE)	(m)6n)
i-Butene	25167-67-3	NA		ΑN		NA	ΑN	¥		
1-Butene	106-98-9	NA		ΝĄ		NA	ΑN	ΑN		
1,3-Butadiene	106-99-0	3.74E-03	၁	3.48E-03	S	3.74E-03	2.20E+04	_	ш	2.20E+04
n-Butane	106-97-8	NA		AN		AN	ΑN	5.71E+06		5.71E+06
trans-2-Butene	624-64-6	NA		AN		NA	ΑN	ΑN		
2,2-Dimethylpropane	463-82-1	NA		NA		NA	AN	ΑN		
cis-2-Butene	590-18-1	NA		NA		AN	AN	ΑN		
3-Methyl-1-butene	563-45-1	NA		NA		NA	Ϋ́	¥		
i-Pentane	109-66-0	NA		NA		ΑN	ΑN	1.80E+06	-	1.80E+06
1-Pentene	109-67-1	NA		AN		N A	ΑN	A		
2-Methyl-1-butene	563-46-2	NA		AN		NA	ΑN	Ā		
n-Pentane	109-66-0	NA		NA		N A	ΑN	1.80E+06	_	1.80E+06
Isoprene	78-79-5	NA		NA		ΑN	Ā	ΑĀ		
trans-2-Pentene	646-04-8	AN		AA		NA.	AN	Ϋ́		
cis-2-Pentene	627-20-3	ΑN		AN		ΑN	AN	ΑN		
2-Methyl-2-butene	513-35-9	NA		NA		NA NA	ΑN	¥		
2,2-Dimethylbutane	75-83-2	NA		NA		ΝΑ	Ą	1.80E+06	_	1.80E+06
Cyclopentene	142-29-0	NA		NA		NA	ΑX	Ν		
4-Methyl-1-pentene	691-37-2	AN		NA		NA	AN	ΑN		
Cyclopentane	287-92-3	NA		NA		NA	ΑN	Ν		
2,3-Dimethylbutane	79-29-8	NA		NA		NA	AN	ΑN		
cis-4-Methyl-2-pentene	691-38-3	AN		NA		NA	ΑN	NA		
2-Methylpentane	107-83-5	AN		NA		NA	NA	1.80E+06	_	1.80E+06
3-Methylpentane	96-14-0	NA		NA		NA	NA	NA		
2-Methyl-1-pentene	763-29-1	A A		ΝΑ		AN	ΝΑ	NA		
1-Hexene	592-41-6	NA		ΑN		NA	ΥN	1.03E+05		1.03E+05
n-Hexane	110-54-3	2.10E+02	nc	2.1E+02	၁ပ	2.10E+02	ΑN	5.28E+05	i T	5.28E+05
trans-2-Hexene	4050-45-7	Ϋ́		ΝΑ		NA	AN	NA		
2-Methyl-2-pentene	625-27-4	Ϋ́		AN		NA	NA	NA		
cis-2-Hexene	7688-21-3	NA		NA		NA	AN	AN		
Methylcyclopentane	96-37-7	NA		NA		NA	NA	NA		
2,4-Dimethylpentane	108-08-7	NA		۷N		NA	NA	NA		
Benzene	71-43-2	2.50E-01	O	2.2E-01	С	2.50E-01	1.56E+05	1.60E+05	E	1.56E+05
Cyclohexane	110-82-7	NA		AN.		NA	NA	3.10E+06	3 T	3.10E+06
2-Methylhexane	591-76-4	ΑN		AN A		NA	AN	NA		
2,3-Dimethylpentane	565-59-3	ΑN		Ϋ́		NA	Ϋ́	ΥN		



Appendix C: Health-Based Screening Levels and Acute Toxicity Values

Corner C	Foxicity Region 3 and Polint RBC	Toxicity	Hantith Land				Acres Toutalis
600 mc) (iighm³) (corno) (iighm³) (corno) 589-34-4 NA NA NA 540-84-1 NA NA NA 142-82-5 NA NA NA 107-39-6 NA NA NA 107-40-4 NA NA NA 108-87-2 3.10E+03 nc 3.1E+03 nc 107-40-4 NA NA NA NA 589-43-5 NA NA NA NA 619-39-8 NA NA NA NA 1071-26-7 NA NA NA NA 1074-26-5 NA NA NA 106-403 nc 1074-26-7 NA NA <		Tracella	Scrooning Lovel	בססב	1	Source	Acute loxicity
589-34-4 NA NA NA 540-84-1 NA NA NA 142-82-5 NA NA NA 107-39-1 NA NA NA 108-87-2 3.10E+03 nc 1.10T-40.3 nc 107-40-4 NA NA NA NA 592-13-2 NA NA NA NA 589-43-5 NA NA NA NA 589-43-1 NA NA NA NA 108-88-3 4.02E+02 nc 4.16E+02 nc 584-94-1 NA NA NA NA 1071-26-7 NA NA NA NA 1071-26-7 NA NA NA NA 1071-26-7 NA NA NA NA 1074-72-6-5 NA NA NA NA 1074-72-6-5 NA NA NA NA 1074-72-6-5 NA NA <td< th=""><th></th><th>(c or nc)</th><th>(Lg/m³)</th><th>(µg/m³)</th><th>(µg/m³)</th><th>(TorE)</th><th>(µg/m³)</th></td<>		(c or nc)	(Lg/m³)	(µg/m³)	(µg/m³)	(TorE)	(µg/m³)
540-84-1 NA NA 142-82-5 NA NA 107-39-1 NA NA 107-39-1 NA NA 108-87-2 3.10E+03 nc 108-87-2 3.10E+03 nc 107-40-4 NA NA 589-43-5 NA NA 589-43-5 NA NA 108-88-3 4.02E+02 nc 4.08-88-3 A.02E+02 nc 584-94-1 NA NA 619-99-8 NA NA 1071-26-7 NA NA 111-65-9 NA NA 111-65-9 NA NA 111-65-9 NA NA 111-65-9 NA NA 100-41-4 1.10E+03 nc 111-65-9 NA NA 100-42-5 NA NA 111-64-7 NA NA 622-96-8 4.00E+02 nc 98-82-8 4.00E	L		AN	NA	ΑN		
142-82-5 NA NA 107-39-1 NA NA 108-87-2 3.10E+03 nc 107-39-1 NA NA 107-40-4 NA NA 592-13-2 NA NA 582-13-2 NA NA 582-13-2 NA NA 582-13-2 NA NA 582-13-2 NA NA 108-88-3 4.02E+02 nc 108-88-3 4.02E+02 nc 108-88-3 NA NA 108-88-3 NA NA 108-89-8 NA NA 1071-26-7 NA NA 111-65-9 NA NA 111-84-2 NA NA<	NA		NA	Ϋ́	3.50E+05	⊢	3.50E+05
107-39-1 NA NA 108-87-2 3.10E+03 nc 3.1E+03 nc 107-40-4 NA NA NA nc 107-40-3 nc 107-40-4 NA NA NA NA nc 107-40-3 nc 107-40-40-3 nc 107-40-40-3 nc 107-40-40-3 nc 107-40-40-3 nc 107-40-40-4 107-40-40-4 107-40-40	AN		NA	NA	1.80E+06	L	1.80E+06
108-87-2 3.10E+03 nc 3.1E+03 nc 107-40-4 NA NA NA 592-13-2 NA NA NA 589-43-5 NA NA NA 565-59-3 NA NA NA 565-59-3 NA NA NA 619-99-8 NA NA NA 619-99-8 NA NA NA 1071-26-5 NA NA NA 1074-26-5 NA NA NA 100-41-4 1.10E+03 nc 1.0E+02 100-42-5 1.10E+03 nc 1.0E+02 100-42-5 1.10E+03 nc 1.0E+02 100-42-5 1.10E+03 nc 1.0E+02 103-85-1 NA NA NA NA 103-65-1 NA NA NA NA 103-65-1 3.6E+01 nc 1.0E+02 nc 103-65-1 3.6E+01 nc 1.0E+02	NA		AN	NA	NA		
107-40-4 NA NA NA NA NA NA NA S92-13-2 NA S92-13-2 NA S92-13-2 NA S92-13-2 NA S92-13-5 NA S92-13-5 NA S92-27-8 NA S92-27-6 NA NA S92-6-8 NA S92-27-6 NA S92-27-8 NA NA NA NA NA NA S92-6-8 NA NA NA NA NA NA S92-27-6 NA NA NA NA NA S92-27-6 NA NA NA NA NA S92-27-6 NA NA NA NA NA S93-27-5 NA NA S93-27-5 NA S92-27-5 NA NA S92-27-5 NA NA S92-27-5 NA S92-27-5 NA NA S92-27-5 NA S92-27-5 NA NA NA S92-27-5 NA NA NA NA NA S92-27-5 NA NA NA NA NA NA S92-27-5 NA		nc	3.10E+03	NA	4.81E+06	T	4.81E+06
592-13-2 NA NA 589-43-5 NA NA 589-43-5 NA NA 565-59-3 NA NA 108-88-3 4.02E+02 nc 4.08-88-3 4.02E+02 nc 584-94-1 NA NA 582-27-8 NA NA 619-99-8 NA NA 1071-26-7 NA NA 1074-26-5 NA NA 108-8-38-3 NA NA 108-6-10-1 NA NA 108-6-1 1.10E+03 nc 108-8-2-1 3.65E+01 nc 622-96-8 3.0	NA		NA	Ϋ́Α	AA		
589-43-5 NA NA 565-59-3 NA NA 108-88-3 4.02E+02 nc 4.16E+02 nc 584-94-1 NA NA NA NA 619-99-8 NA NA NA NA 1071-26-7 NA NA NA NA 10747-26-5 NA NA NA NA 106-403 NA NA NA NA 107-42-5 1.10E+03 nc 1.0E+03 nc 622-96-8 NA NA NA NA 620-14-4 NA NA	AN		NA	AA	ΑN		
565-59-3 NA NA 108-88-3 4.02E+02 nc 4.16E+02 nc 584-94-1 NA NA NA 619-99-8 NA NA NA 1071-26-7 NA NA NA 117-65-9 NA NA NA 117-65-9 NA NA NA 110-41-4 1.10E+03 nc 1.1E+03 100-41-5 NA NA NA 100-41-4 1.10E+03 nc 1.1E+03 100-41-5 NA NA NA 100-42-5 1.10E+03 nc 1.0E+03 100-42-5 1.10E+03 nc 1.0E+03 100-42-5 1.10E+03 nc 1.0E+03 103-65-1 1.0E+03 nc 4.0E+02 nc 103-65-1 1.0E+03 nc 1.0E+02 nc 622-96-8 NA NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA 1	NA		NA	NA	NA		
108-88-3 4.02E+02 nc 4.16E+02 nc 584-94-1 NA NA NA 592-27-8 NA NA NA 619-99-8 NA NA NA 1071-26-7 NA NA NA 1071-26-7 NA NA NA 1071-26-7 NA NA NA 10747-26-5 NA NA NA 110-41-4 1.10E+03 nc 1.1E+03 nc 100-41-4 1.10E+03 nc 1.1E+03 nc 108-38-3 NA NA NA nc 100-42-5 1.10E+03 nc 1.0E+03 nc 108-38-3 NA NA 1.0E+03 nc 111-84-2 NA NA 1.0E+03 nc 103-65-1 3.65E+01 nc 1.5E+02 nc 622-96-8 NA NA NA NA 620-14-4 NA NA NA NA 95-63-6 6.21E+00 nc 6.21E+00 nc	NA		NA	NA			
584-94-1 NA NA 592-27-8 NA NA 619-99-8 NA NA 1071-26-7 NA NA 116747-26-5 NA NA 111-65-9 NA NA 110-41-4 1.10E+03 nc 100-41-4 1.10E+03 nc 100-41-5 1.10E+03 nc 100-42-5 1.10E+03 nc 100-42-5 1.10E+03 nc 100-42-5 1.10E+03 nc 108-38-3 NA NA 100-42-5 1.10E+03 nc 108-8-7-6 NA NA 103-62-1 3.65E+01 nc 622-96-8 NA NA 622-96-8 NA NA 622-96-8 NA NA 611-14-3 NA NA 108-67-8 6.21E+00 nc 611-14-3 NA NA 124-18-5 NA NA 127-91-3 NA NA 127-91-3 NA <td< td=""><td></td><td>nc</td><td>4.02E+02</td><td>1.88E+05</td><td>1.89E+05</td><td>Ш</td><td>1.88E+05</td></td<>		nc	4.02E+02	1.88E+05	1.89E+05	Ш	1.88E+05
592-27-8 NA NA 619-99-8 NA NA 1071-26-7 NA NA 16747-26-5 NA NA 111-65-9 NA NA 111-65-9 NA NA 110-42-5 NA NA 100-42-5 1.10E+03 nc 100-42-5 1.10E+03 nc 100-42-5 1.10E+03 nc 111-84-2 NA 1.0E+03 nc 111-84-2 NA 4.0E+02 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 4.0E+02 nc 622-96-8 NA NA NA NA 620-14-4 NA NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA 80-56-8 NA NA NA 124-18-5 NA NA NA 127-91-3 NA NA NA 5989-2	NA		NA	NA	NA		
619-99-8 NA NA 1071-26-7 NA 16747-26-5 NA 111-65-9 NA 110-42-5 NA 100-42-5 1.10E+03 nc 111-84-2 NA 122-96-8 NA 122-96-8 NA 122-96-8 NA 124-18-5 NA 124-18-5 NA 127-91-3 NA 13466-78-9 NA 13466-78-9 NA 13466-78-9 NA 1634-04-4 3.10E+03 nc 3.1E+03	NA		NA	NA	NA		
1071-26-7 NA NA 16747-26-5 NA NA 111-65-9 NA NA 110-41-4 1.10E+03 nc 100-41-4 1.10E+03 nc 100-42-5 1.10E+03 nc 11-84-2 NA A.0E+02 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 622-96-8 NA NA NA NA 620-14-4 NA NA NA NA 620-14-4 NA NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA NA 80-56-8 NA NA NA NA 127-91-3 NA	NA		NA	NA	NA		
16747-26-5 NA NA 111-65-9 NA NA 1678-91-7 NA NA 100-41-4 1.10E+03 nc 1.1E+03 100-41-4 1.10E+03 nc 1.0E+03 100-42-5 1.10E+03 nc 1.0E+03 100-42-5 1.10E+03 nc nc 95-47-6 NA 7.3E+03 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 111-84-2 NA NA NA nc 103-65-1 3.65E+01 nc 4.0E+02 nc 622-96-8 NA NA NA NA 620-14-4 NA NA NA NA 620-14-4 NA NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA NA 80-56-8 NA NA NA NA 127-91-3 NA	NA		NA	NA	NA		
111-65-9 NA NA 1678-91-7 NA NA 100-41-4 1.10E+03 nc 1.1E+03 nc 100-42-5 1.10E+03 nc 1.0E+03 nc 100-42-5 1.10E+03 nc 1.0E+03 nc 95-47-6 NA 1.0E+03 nc nc 111-84-2 NA 4.0E+02 nc nc 98-82-8 4.00E+02 nc 4.0E+02 nc nc 103-65-1 3.65E+01 nc 1.5E+02 nc nc nc 622-96-8 NA NA NA NA nc 6.2E+00 nc nc 6.2E+00 nc 6.2E+00 nc 1.0B-67 nc nc nc 1.0B-67 nc nc<	NA		AN	NA	NA		
1678-91-7 NA NA 100-41-4 1.10E+03 nc 1.1E+03 nc 108-38-3 NA NA NA nc 1.0E+03 nc 100-42-5 1.10E+03 nc 1.0E+03 nc 96-82-8 nc 1.0E+02 nc 1.0E+02 nc 96-82-8 nc 1.0E+02 nc 1.0E+02 nc 96-82-8 nc 1.0E+02 nc </td <td>NA</td> <td></td> <td>NA</td> <td>ΥN</td> <td>ΑN</td> <td></td> <td></td>	NA		NA	ΥN	ΑN		
100-41-4 1.10E+03 nc 1.1E+03 nc 108-38-3 NA NA NA nc 1.0E+03 nc 100-42-5 1.10E+03 nc 1.0E+03 nc 95-47-6 nc 1.0E+03 nc 1.0E+03 nc 96-82-8 nc 1.0E+02 nc 1.0E+02 nc 1.0E+02 nc 1.0E+02 nc 1.0E+02 nc nc nc nc 1.0E+02 nc nc nc 1.0E+02 nc nc nc nc 1.0E+02 nc	NA		NA	Ϋ́	NA		
108-38-3 NA NA 100-42-5 1.10E+03 nc 1.0E+03 nc 100-42-5 1.10E+03 nc 1.0E+03 nc 95-47-6 NA 4.0E+02 nc 111-84-2 NA 4.0E+02 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 1.5E+02 nc 622-96-8 NA NA NA NA 108-67-8 6.20E+01 nc 6.2E+00 nc 620-14-4 NA NA NA NA 108-67-8 6.21E+00 nc 6.2E+00 nc 611-14-3 NA NA NA NA 80-56-8 NA NA NA NA 124-18-5 NA NA NA NA 127-91-3 NA NA NA NA 5989-27-5 NA NA NA NA 1634-04-4 3.		nc	1.10E+03	Ϋ́	5.43E+05	-	5.43E+05
100-42-5 1.10E+03 nc 1.0E+03 nc 95-47-6 NA 7.3E+03 nc 111-84-2 NA 4.0E+02 nc 103-65-1 3.65E+01 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 4.0E+02 nc 622-96-8 NA NA NA nc 620-14-4 NA NA NA nc 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA 80-56-8 NA NA NA 124-18-5 NA NA NA 127-91-3 NA NA NA 13466-78-9 NA NA NA 5989-27-5 NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03	AN		NA	Ϋ́	-		6.51E+05
95-47-6 NA 7.3E+03 nc 111-84-2 NA 4.0E+02 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 1.5E+02 nc 622-96-8 NA		ou .	1.10E+03	2.13E+05	_	ш	2.13E+05
111-84-2 NA 4.0E+02 nc 98-82-8 4.00E+02 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 4.0E+02 nc 622-96-8 NA NA NA nc 620-14-4 NA NA NA nc 620-14-3 NA NA NA nc 611-14-3 NA NA NA nc 95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA NA 127-91-3 NA NA NA NA 13466-78-9 NA NA NA NA 5989-27-5 NA NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc	7.3E+03	nc	7.30E+03	Y Y	6.51E+05		6.51E+05
98-82-8 4.00E+02 nc 4.0E+02 nc 103-65-1 3.65E+01 nc 1.5E+02 nc 622-96-8 NA NA 620-14-4 NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA	4.0E+02	ПС	4.02E+02	A A	1.05E+06	⊢	1.05E+06
103-65-1 3.65E+01 nc 1.5E+02 nc 622-96-8 NA NA NA 620-14-4 NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA 95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA 127-91-3 NA NA NA 13466-78-9 NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03		nc	4.00E+02	A A	ΑN		
622-96-8 NA NA 620-14-4 NA NA 108-67-8 6.20E+00 nc 6.2E+00 611-14-3 NA NA 95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA 127-91-3 NA NA NA 13466-78-9 NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc		nc	3.65E+01	NA	Ϋ́		
620-14-4 NA NA NA NA NA 108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA Secondary NA Secondary NA NA NA NA NA NA NA Secondary NA NA NA NA NA Secondary NA	NA		AN	NA A	1.25E+05	⊥	1.25E+05
108-67-8 6.20E+00 nc 6.2E+00 nc 611-14-3 NA NA NA 95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA 80-56-8 NA NA NA 13766-78-9 NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc			NA	A A	A V		
611-14-3 NA NA NA 95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA 127-91-3 NA NA NA 13466-78-9 NA NA 1634-04-4 3.10E+03 nc 3.1E+03	9	nc	6.20E+00	NA	3.68E+05	⊢	3.68E+05
95-63-6 6.21E+00 nc 6.21E+00 nc 124-18-5 NA NA NA NA NA 127-91-3 NA NA NA NA NA 13466-78-9 NA NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc	NA		NA	A V	7.50E+02	-	7.50E+02
124-18-5 NA NA NA NA 127-91-3 NA 13466-78-9 NA NA NA S989-27-5 NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc	9	nc	6.21E+00	NA	1.80E+05	T	1.80E+05
80-56-8 NA NA NA 127-91-3 NA 13466-78-9 NA NA NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc	NA		NA	A V	4.37E+03	_	4.37E+03
127-91-3 NA NA NA 13466-78-9 NA NA S989-27-5 NA NA NA NA NA NA 1634-04-4 3.10E+03 nc 3.1E+03 nc	NA		Υ	Α̈́	4.00E+04	Η.	4.00E+04
13466-78-9 NA NA NA S 1054-04-4 3.105+03 nc 3.15+03 nc	NA		NA	ΑN	NA		
5989-27-5 NA NA NA 1634-04-4 3.10E+03 nc	AN:		AN	NA	ΑN		
1634-04-4 3.10E+03 nc 3.1E+03 nc	NA		NA	A	1.95E+06	-	1.95E+06
	nc 3.1E+03	nc	3.10E+03	Ϋ́	4.32E+05	-	4.32E+05
nc		nc	2.10E+02	NA	1.48E+07		1.48E+07

			For the	Chronic Eva	Chronic Evaluation (HBSL	SL)	F	or the Acu	For the Acute Evaluation (ATV	ion (ATV)
punoduoò	CAS#	Region 9 PRG	Toxicity Endpoint	Region 3 RBC	Toxicity Endpoint	Health-based Screening Level	ERPG	單	Source	Acute Toxicity Value
		((mg/m³)	(c or nc)	.'(µg/m³)	(c or nc)	((lig/m³)	(mg/m³)	(µg/m³)	(T or E)	(morm)
Methylchloride	74-87-33	NA		NA		NA	AN	٩N		
Dichlorotetrafluoroethane	374-07-2	NA		NA		NA	ΑN	NA		
Chloroethene	75-01-4	2.20E-02	ပ	2.1E-02	O	2.20E-02	NA	1.28E+04	_	1.28E+04
1,3-Butadiene	106-99-0	3.74E-03	၁	3.48E-03	O	3.74E-03	2.20E+04	2.21E+04	ш	2.20E+04
Methylbromide	74-83-9	5.20E+00	uc	5.1E+00	uc	5.20E+00	٧	5.82E+04		5.82E+04
Ethylchloride	75-00-3	2.30E+00	၁	2.2E+00	O	2.30E+00	ΑN	7.92E+06	-	7.92E+06
Trichloromonofluoromethane	75-69-4	7.30E+02	nc	7.30E+02	nc	7.30E+02	Ϋ́	2.81E+06	_	2.81E+06
Vinylidene chloride	75-35-4	VΝ		NA		NA	Ϋ́	7.92E+04	_	7.92E+04
Methylene chloride	75-09-2	4.10E+00	O	3.8E+00	ပ	4.10E+00	6.96E+05	6.94E+05		6.96E+05
Allyl chloride	107-05-1	1.00E+00	nc	AN		1.00E+00	9.39E+03	-	ш	9.39E+03
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	3.13E+04	uc	3.14E+04	uc	3.13E+04	AN A	9.58E+06		9.58E+06
1,1-Dichloroethane	75-34-3	5.21E+02	nc	5.11E+02	nc	5.21E+02	AN	1.21E+06	_	1.21E+06
1,2-Dichloroethene	540-59-0	AN		3.29E+01	nc	3.29E+01	ΑΝ	2.38E+06	-	2.38E+06
Chloroform	67-66-3	8.40E-02	ပ	2.2E+00	၁	8.40E-02	AA	9.76E+03	-	9.76E+03
1,2-Dichloroethane	107-06-2	7.39E-02	υ	6.88E-02	U	7.39E-02	ΑN	8.08E+03	_	8.08E+03
Methylchloroform	71-55-6	1.00E+03	nc	2.3E+03	nc	1.00E+03	ΑN	1.91E+06	-	1.91E+06
Benzene	71-43-2	2.50E-01	၁	2.2E-01	ပ	2.50E-01	NA	1.60E+05	-	1.60E+05
Carbontetrachloride	56-23-5	1.04E+03	nc	1.04E+03	nc	1.04E+03	1.28E+05	1.26E+05	Е	1.28E+05
1,2-Dichloropropane	78-87-5	9.89E-02	υ	9.21E-02	O	9.89E-02	Α	5.08E+05	_	5.08E+05
Trichloroethylene	79-01-6	1.12E+00	၁	1.04E+00	၁	1.12E+00	ΑN	5.37E+05		5.37E+05
cis 1,3-Dichloro-1-propene	10061-01-5	NA		NA		NA	ΑN	1.14E+04	<u></u>	1.14E+04
trans 1,3-Dichloro-1-propene	10061-02-6	NA		NA		NA	ΑN	۸ A		
1,1,2-Trichloroethane	2-00-62	1.20E-01	C	1.12E-01	၁	1.20E-01	NA	1.64E+05	7 T	1.64E+05
Toluene	108-88-3	4.02E+02	nc	4.16E+02	nc	4.02E+02	1.88E+05	1.89E+05	9 E	1.88E+05
1,2-Dibromoethane	106-93-4	8.73E-03	Э	8.24E-03	၁	8.73E-03	NA	1.54E+05	5 T	1.54E+05
Perchloroethylene	127-18-4	3.31E+00	o O	3.13E+00	၁	3.31E+00	6.89E+05	6.78E+05	E	6.89E+05
Chlorobenzene	108-90-7	6.20E+01	ou ·	6.2E+01	nc	6.20E+01	NA	1.38E+05	5 T	1.38E+05
Ethylbenzene	100-41-4	1.10E+03	nc	1,1E+03	nc	1.10E+03	NA	4.34E+03	3 T	4.34E+03
m&p-Xylene	108-38-3	7.30E+02	nc	AN		7.30E+02	NA		T T	6.51E+05
Styrene	100-42-5	1.06E+03	nc	1.04E+03	nc	1.06E+03	2.13E+05	2.13E+05	3 E	2.13E+05
1,1,2,2-Tetrachloroethane	79-34-5	3.31E-02	၁	3.13E-02	С	3.31E-02	NA	2.06E+04	1	2.06E+04
o-Xylene	95-47-6	7.30E+02	nc	7.3E+03	nc	7.30E+02	NA	6.51E+05	2 T	6.51E+05
p-Ethyltoluene	622-96-8	AN		AN		NA	AN	1.25E+05	7 2	1.25E+05
1,3,5-Trimethylbenzene	108-67-8	6.21E+00	nc	6.21E+00	nc	6.21E+00	NA	3.68E+05	2 T	3.68E+05
1,2,4-Trimethylbenzene	95-63-6	6.21E+00	nc	6.21E+00	nc	6.21E+00	NA	1.80E+05	5 T	1.80E+05
Benzylchloride	100-44-7	4.00E-02	nc	3.7E-02	ပ	4.00E-02	5.20E+03	5.20E+03 5.17E+03	3	5.20E+03





Appendix C: Health-Based Screening Levels and Acute Toxicity Values

			For the	For the Chronic Evaluation (HBSL	uation (HB	SL)		For the Acute Evaluation (ATV)	e Evaluati	ion (ATV)
		Danion 0	Tavicity	Danion 3	Taylolfu	Hosith hasor				Acute Tovicity
Compound	CAS#	PRG	Endpoint	RBC	Endpoint	Screening Level	ERPG	TEEL	Source	Value
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(µg/m³)	(mg/m ₃)	(µд/ш³)	(T or E)	(µg/m³)
m-Dichlorobenzene	541-73-1	3.30E+00	nc	3.3E+00	nc	3.30E+00	AN	3.61E+04) —	3.61E+04
p-Dichlorobenzene	106-46-7	2.80E-01	С	2.85E-01	၁	2.80E-01	NA	6.61E+05	Ţ	6.61E+05
o-Dichlorobenzene	95-50-1	2.09E+02	nc	3.29E+01	nc	2.09E+02	NA	3.01E+05	⊢	3.01E+05
1,2,4-Trichlorobenzene	120-82-1	NA		NA		NA	NA	3.71E+04	1	3.71E+04
Hexachlorobutadiene	87-68-3	8.73E-02	C	8.03E-02	၁	8.73E-02	3.21E+04	-	Ε	3.21E+04
trans-1,2-Dichloroethene	156-60-5	7.30E+01	nc	7.3E+01	nc	7.30E+01	NA	4.95E+04	T	4.95E+04
o-Chiorotoluene	95-49-8	7.30E+01	nc	7.3E+01	nc	7.30E+01	NA	3.88E+05	⊥	3.88E+05
p-Chlorotoluene	106-43-4	NA		NA		NA	NA	3.88E+05	⊢	3.88E+05
1,3,5-Trichlorobenzene	108-70-3	NA		NA		NA	NA	NA		
1,2,3-Trichlorobenzene	87-61-6	NA		NA		NA	NA	5.00E+04	Τ	5.00E+04
Methylnitrite	624-91-9	NA		NA		NA	NA	NA		
Acetonitrile	75-05-8	6.20E+01	nc	6.2E+01	nc	6.20E+01	NA	_	Τ	1.01E+05
Acrylonitrile	107-13-1	2.80E-02	၁	2.6E-02	С	2.80E-02	2.20E+04	2.17E+04	Ε	2.20E+04
Nitromethane	75-52-5	NA		NA		NA	NA	1.50E+05	j —	1.50E+05
Benzonitrile	100-47-0	NA		NA		NA	NA	1.50E+04	⊢	1.50E+04
Nitrobenzene	98-95-3	2.09E+00	nc	2.19E+00	nc	2.09E+00	NA	1.51E+04	Ţ	1.51E+04
Carbonyl Sulfide	463-58-1	NA		AN		NA	NA	_	1	9.84E+03
Sulfur Dioxide	7446-09-5	NA		NA		NA	7.80E+02	7.86E+02	В	7.80E+02
Carbon Disulfide	75-15-0	7.30E+02	nc .	7.3E+02	nc	7.30E+02	NA	3.73E+04	T	3.73E+04
Thiophene	110-02-1	ΝΑ		ΑN		NA	NA	_		
Dimethyldisulfide	624-92-0	A A		ΑN		NA	4.00E+01	3.85E+01	Ш	4.00E+01
2-Methylthiophene	554-14-3	NA		NA		NA	NA	NA		
3-Methylthiophene	616-44-4	ΝΑ		AN		NA	NA	NA		
Dimethyltrisulfide	3658-80-8	A V		A V		NA	ΑN	NA		
Isothiocyanatomethane	556-61-6	ΑN		A N		NA	NA	NA		
2-Chlorothiophene	96-43-5			NA		NA	NA	NA		
3-Chlorothiophene	17249-80-8			NA NA		NA	NA	ΝΑ		
2-Thiophenecarboxaldehyde	98-03-3	A A		ΑN		NA	AA	NA		
Naphthalene	91-20-3	3.13E+00	nc	3.29E+00	nc	3.13E+00	NA	7.86E+04	1	7.86E+04
Acetaldehyde	75-07-0	8.70E-01	ပ	8.1E-01	c	8.70E-01	1.80E+04		Ε	1.80E+04
Acrolein	107-02-8	2.10E-02	nc	2.1E-02	nc	2.10E-02	2.30E+02	2.29E+03	Ш	2.30E+02
Acetone	67-64-1	3.40E+02	nc	3.7E+02	nc	3.40E+02	AN	2.37E+06	L	2.37E+06
Propanal	123-38-6	ΑΝ		NA AN		NA	NA	7.50E+04	T	7.50E+04
Furan	110-00-9	3.70E+00	nc	ΑΝ		3.70E+00	NA	1.67E+02	T	1.67E+02
2-Propanol	67-63-0	A A		NA		NA	NA	9.84E+05	⊢	9.84E+05
2-Methylpropanal	78-84-2	A V		A A		NA	¥	NA		

				THE BEST OF THE PARTY OF		ÚL)	_	コンス・コニ・コ	For the Acute Evaluation (AIV)	
Compound	CAS#	Region 9 PRG	Toxicity Endpoint	Region 3 RBC	Toxicity Endpoint	Health-based Screening Level	ERPG	Ī	Source	Acute Toxicity Value
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(m/bil)	(mg/m³)	(mg/m³)	(I or E)	("m/on)
Methacrotein	78-85-3	NA		ΑN		NA	Ä	ΑN		
2,3-Butanedione	625-34-3	NA		AN		NA	AN	ΥN		
Methyl-Vinyl Ketone	78-94-4	NA		NA		NA	AN	8.61E+01	F	8.61E+01
MTBE	1634-04-4	3.10E+03	ou	3.1E+03	nc	3.10E+03	ΑĀ	4.32E+05	 -	4.32E+05
Butanal	123-72-8	NA		NA		NA	NA	7.38E+04	_	7.38E+04
2-Butanone	78-93-3	1.00E+03	nc	1.0E+03	nc	1.00E+03	ΑN	8.85E+05	⊢	8.85E+05
Tetrahydrofuran	109-99-9	9.89E-01	uc	9.21E-01	ပ	9.89E-01	ΑĀ	7.38E+05	F	7.38E+05
2-Methyl-1-propanol	78-83-1	1.10E+03	nc	1.1E+03	nc	1.10E+03	۷V	4.55E+05	F	4.55E+05
trans-2-Butenal	123-73-9	3.54E-03	၁	3.30E-03	၁	3.54E-03	NA	ΑN		
Acetic Acid	64-19-7	NA		NA		NA	ΑN	3.68E+04	⊥	3.68E+04
2-Pentanone	107-87-9	NA		NA		NA	ΑN	8.80E+05	_	8.80E+05
Pentanal	110-62-3	AN		NA		NA	NA	NA		
4-Methyl-2-pentanone	108-10-1	8.30E+01	nc	7.3E+01	nc	8.30E+01	NA	3.07E+05	_	3.07E+05
trans-2-Pentenal	1567-87-0	NA		NA		NA	AN	N A		
Cyclopentanone	120-92-3	NA		. AN		NA	ΑĀ	¥		
2-Hexanone	591-78-6	NA		5.1E+00	nc	5.11E+00	A	4.09E+04	-	4.09E+04
Hexanal	66-25-1	NA		ΝA		NA	Ą	Ą		
3-Furaldehyde	498-60-2	NA		ΥN		NA	NA	Ϋ́		
Butyl Acetate	123-86-4	NA		VΝ		AN	ΝA	ΑĀ		
2-Furaldehyde	98-01-1	5.20E+01	uc	3.7E+01	nc	5.20E+01	NA	7.86E+03	T	7.86E+03
trans-2-Hexenal	6728-26-3	ΝΑ		NA		NA	NA	ΝΑ		
1-Hexanol	111-27-3	NA		AN		NA	NA	8.36E+03	T	8.36E+03
3-Heptanone	106-35-4	NA		NA		NA	NA	NA		
Je	110-43-0			ΑN		NA	NA	1.70E+03	_	1.70E+03
	66-25-1			ΑĀ		NA	Ϋ́	ΑN		
	18829-55-5			Υ Y		NA	٧N	ΑN		
5-Methyl-2-furaldehyde	620-02-0	ΝΑ		ΑΝ		NA	¥	AN		
6-Methyl-2-heptanone	928-68-7	Ϋ́		NA		NA	٧N	ΝA		
Benzaldehyde	100-52-7	3.70E+02	nc	3.7E+02	nc	3.70E+02	NA	1.50E+04	-	1.50E+04
1-Heptanol	111-70-6	NA		ΝA		NA	NA	AN		
6-Methyl-5-hepten-2-one	110-93-0	NA		NA		NA	NA	NA		
2-Octanone	111-13-7	NA		AN		NA	NA	۸N		
Octanal	124-13-0	A A		NA		NA	NA	NA		
Benzofuran	271-89-6			NA		NA	NA	ΑN		
trans-2-Octenal	2548-87-0			N A		NA	A A	٩		
Acetophenone	98-86-2	2.10E-02	nc	2.1E-02	nc	2.10E-02	₹ V	3.00E+04	-	3.00E+04

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

Compound CAS# 2-Nonanone 821-55-6 Londanal 124-19-6 Itans-2-Nonenal 18829-56-6 2-Decanone 693-54-9 Decanal 112-31-2 N-Nitrosodimethylamine 62-75-9 Pyridine 109-06-8 N-Nitrosomethylethylamine 66-27-3 N-Nitrosomethylethylamine 66-27-3 N-Nitrosomethylethylamine 62-50-0 Phenol 62-50-0 Phenol 62-50-0 Phenol 62-53-3 Aniline 76-01-7 Pentachloroethane 76-01-7 2-Chlorophenol 95-57-8 1,3-Dichlorobenzene 106-46-7 1,4-Dichlorobenzene 106-46-7 106-46-7 2	03 05 03 05 03	Endpoint (c or nc)	Region 3 (ug/m³) NA NA NA NA	Toxicity Endpoint	Health-based Screening Level	ERPG	TEEL (µg/m³)	Source	Acute Toxicity Value (ua/m³)
821-55-6 124-19-6 18829-56-6 693-54-9 112-31-2 62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	(µg/m³) NA NA NA NA NA 1.40E-04 3.65E+00 NA NA NA NA NA NA 2.19E+03 NA NA NA NA NA NA NA NA NA N	Cornc)	(µg/m³) NA NA NA	(cornc)			(µg/m³)	í	(ua/m³)
821-55-6 124-19-6 18829-56-6 693-54-9 112-31-2 62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 76-01-7 76-01-7 76-01-7 106-46-7	NA NA NA NA NA 1.40E-04 3.65E+00 NA NA 3.06E-04 A.47E-05 NA NA 2.19E+03 NA 5.80E-03	0 2 0 0 2	AN N N		(µg/m³)	(µg/m³)		(T or E)	
124-19-6 18829-56-6 693-54-9 112-31-2 62-75-9 1109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA NA NA NA 1.40E-04 3.65E+00 NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 2 0 0	A A A		NA	ΝΑ	ΑN		
18829-56-6 693-54-9 112-31-2 62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA NA NA 1.40E-04 3.65E+00 NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 2 0 0	AN A		NA	Ϋ́	Ϋ́		
693-54-9 112-31-2 62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA NA 1.40E-04 3.65E+00 NA NA NA 2.19E+03 NA NA NA NA NA NA NA NA NA NA NA NA NA	0 2 0 0	NIA		NA	ΑN	Ϋ́		
112-31-2 62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA 1.40E-04 3.65E+00 NA NA 3.06E-04 4.47E-05 NA NA NA NA NA 5.80E-03	0 2 0 0			NA	AN	ΑN		
62-75-9 110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	1.40E-04 3.65E+00 NA NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 0 0	NA		NA	ΑN	ΑN		
110-86-1 109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	3.65E+00 NA NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	2 0 0 2	1.2E-04	C	1.40E-04	NA	2.50E+03	_	2.50E+03
109-06-8 66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 0 2	3.65E+00	nc	3.65E+00	AN	4.85E+04	⊢	4.85E+04
66-27-3 10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA 3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 0 2	NA		NA	ΑN	ΑN		
10595-95-6 55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	3.06E-04 4.47E-05 NA 2.19E+03 NA 5.80E-03	0 0 2	NA		AN	ΑN	ΑN		
55-18-5 62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	A.47E-05 NA 2.19E+03 NA 5.80E-03	o 2	2.85E-04	S	3.06E-04	ΑN	ΑN		
62-50-0 108-95-2 62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	NA 2.19E+03 NA 5.80E-03	20	4.17E-05	υ	4.47E-05	ΑN	ΑN		
108-95-2 62-53-3 1111-44-4 76-01-7 95-57-8 543-73-1 106-46-7	2.19E+03 NA 5.80E-03	UC	NA		AN	NA	ΑΝ		
62-53-3 111-44-4 76-01-7 95-57-8 543-73-1 106-46-7 100-51-6	NA 5.80E-03		2.19E+03	nc	2.19E+03	3.85E+05	3.85E+04	Ш	3.85E+05
76-01-7 95-57-8 543-73-1 106-46-7	5.80E-03		1.1E+00	nc	1.06E+00	Ϋ́	2.29E+04	L	2.29E+04
76-01-7 95-57-8 543-73-1 106-46-7 100-51-6		S	5.7E-03	0	5.80E-03	AN	5.85E+04	L	5.85E+04
95-57-8 543-73-1 106-46-7 100-51-6	AN		ΝΑ		AN	NA	Ϋ́		
543-73-1 106-46-7 100-51-6	1.80E+01	nc	1.8E+01	nc	1.80E+01	AN	5.25E+03	F	5.25E+03
106-46-7	NA.		NA		NA	NA	ΑN		
100-51-6	2.80E-01	၁	2.85E-01	o -	2.80E-01	NA	6.61E+05	⊢	6.61E+05
	1.10E+03	nc	1.1E+03	nc	1.10E+03	NA	5.53E+04	Τ	5.53E+04
95-48-7	NA		NA		NA	NA	6.63E+04	T	6.63E+04
95-50-1	2.09E+02	nc	3.29E+01	nc	2.09E+02	NA	3.01E+05	-	3.01E+05
_	1.92E-01	၁	1.79E-01	ပ	1.92E-01	NA	6.99E+04	T	6.99E+04
95-53-4	2.80E-02	ပ	2.6E-02	၁	2.80E-02	NA	2.63E+04	T	2.63E+04
lol 1319-77-3	NA		Ϋ́		NA	AA	6.63E+04	T	6.63E+04
amine 621-64-7	9.61E-04	O	8.94E-04	ပ .	9.61E-04	ΑN	5.32E+03	Τ	5.32E+03
98-86-2	2.10E-02	ျှ	2.1E-02	nc	2.10E-02	NA	1.47E+05	1	1.47E+05
59-89-2	NA		AN		NA	NA	3.00E+04	1	3.00E+04
930-55-2	3.15E-03	υ	3.0E-03	ပ	3.15E-03	NA	NA		
Hexachloroethane 67-72-1 4	4.80E-01	c	4.47E-01	ပ	4.80E-01	NA	2.90E+04	T	2.90E+04
Nitrobenzene 98-95-3 2	2.09E+00	nc	2.19E+00	nc	2.09E+00	NA	1.51E+04	_	1.51E+04
4	. VA		. VA		. NA	NA	NA		
-	7.08E+00	C	6.59E+00	ဝ	7.08E+00	AN	2.83E+04	L	2.83E+04
	7.30E+01	nc	7.3E+01	nc	7.30E+01	NA	NA		
	NA		NA		NA	NA	NA		
bis(2-Chloroethoxy)methane	ΑN		AN		AN	ΑN	Ϋ́		

			For the	For the Chronic Evaluation (HBSL	luation (HB	SL)	Ē	or the Acu	For the Acute Evaluation (ATV)	ion (ATV)
punodwo2	CAS#	Region 9 PRG	Toxicity Endpoint	Region 3 RBC	Toxicity Endpoint	Health-based Screening Level	ERPG		Source	Acute Toxicity Value
And the second s		(µg/m³)	(c or nc)	(lig/m³)	(c or nc)	(m/m)	(mg/m³)	(ug/m³)	(T or E)	
Benzoic acid	0-58-59	1.50E+04	nc	1.5E+04	nc 2	1.50E+04	AN	1.25E+04		1.25E+04
2,4-Dichlorophenol	120-83-2	1.10E+01	nc	1.1E+01	nc	1.10E+01	NA NA	3.00E+04	-	3.00E+04
1,2,4-Trichlorobenzene	120-82-1	NA		NA		NA	NA	3.71E+04		3.71E+04
Naphthalene	91-20-3	3.13E+00	uc	3.29E+00	bu	3.13E+00	Ϋ́	7.86E+04	-	7.86E+04
p-Chloroaniline	106-47-8	1.46E+01	nc	1.46E+01	uc	1.46E+01	ΝA	5.21E+03	_	5.21E+03
2,6-Dichlorophenol	87-65-0	NA		NA		NA	ΑΝ	3.00E+04	-	3.00E+04
Hexachloropropene	1888-71-7	NA		NA		NA	۸A	AN		
Hexachlorobutadiene	87-68-3	8.73E-02	၁	8.03E-02	၁	8.73E-02	3.21E+04	3.20E+04	ш	3.21E+04
Dimethylphenethylamine		NA		NA		NA	ΑN	ΑĀ		
N-Nitroso-di-n-butylamine	924-16-3	1.20E-03	U	1.12E-03	၁	1.20E-03	NA	ΑĀ		
4-Chloro-3-methylphenol	35421-08-0	VΑ		ΝA		NA	ΑN	Ā		
Safrole	94-59-7	NA		NA		NA	Ν	ΑN		
2-Methylnaphthalene	91-57-6	AN		NA		NA	ΑN	2.00E+04	_	2.00E+04
1,2,4,5-Tetrachlorobenzene	95-94-3	1.10E+00	nc	1.10E+00	ou	1.10E+00	AN	3.00E+04	 -	3.00E+04
Hexachlorocyclopentadiene	77-47-4	7.30E-02	nc	7.30E-02	nc	7.30E-02	NA	2.23E+02	_	2.23E+02
2,4,6-Trichlorophenol	88-06-2	6.20E-01	S	6.3E-01	S	6.20E-01	NA	3.00E+04	_	3.00E+04
2,4,5-Trichlorophenol	95-95-4	3.70E+02	. nc	3.7E+02	uc	3.70E+02	NA	3.00E+04	<u></u>	3.00E+04
Isosafroie	120-58-1	۷N		۷N		¥.	Ā	Ϋ́		
2-Chloronaphthalene	91-58-7	2.90E+02	nc	2.9E+02	nc	2.90E+02	NA	6.00E+02	<u></u>	6.00E+02
2-Nitroaniline	88-74-4	2.10E-01	nc	2.1E-01	nc	2.10E-01	NA	NA		
1,4-Naphthoquinone	130-15-4	NA		۷V		NA	NA	2.50E+02	_	2.50E+02
Dimethylphthalate	131-11-3	3.65E+04	nc	3.65E+04	nc	3.65E+04	ΑA	1.50E+04	<u></u>	1.50E+04
1,3-Dinitrobenzene	0-99-66	3.70E-01	ou .	3.7E-01	nc	3.70E-01	NA	3.00E+03		3.00E+03
2,6-Dinitrotoluene	606-20-2	3.70E+00	nc	3.7E+00	nc	3.70E+00	NA	6.00E+02	2 T	6.00E+02
Acenaphthylene	208-96-8	NA		NA		NA	NA	2.00E+02	7 T	2.00E+02
3-Nitroaniline	99-09-2	NA		NA		NA	NA	NA		
4-Nitrophenol	100-02-7	2.90E+01	nc	2.9E+01	nc	2.90E+01	NA	3.00E+04	†	3.00E+04
2,4-Dinitrophenol	51-28-5	7.30E+00	nc	7.3E+00	nc	7.30E+00	NA	7.50E+03	1	7.50E+03
Acenaphthene	83-32-9	2.20E+02	ou .	2.2E+02	nc	2.20E+02	NA	1.25E+03	3 T	1.25E+03
2,4-Dinitrotoluene	121-14-2	7.30E+00	nc	7.3E+00	nc	7.30E+00	NA	6.00E+02	7	6.00E+02
Dibenzofuran	132-64-9	1.46E+01	nc	1.46E+01	nc	1.46E+01	NA	1.50E+00) T	1.50E+00
Pentachlorobenzene	608-93-5	2.92E+00	nc	2.92E+00	nc	2.92E+00	AN	3.00E+04	4 ⊥	3.00E+04
1-Naphthylamine	134-32-7	NA		NA		NA	NA	3.50E+04	4 T	3.50E+04
2-Naphthylamine	91-59-8	Ϋ́		NA		NA	ΑN	7.50E+03	3 T	7.50E+03
2,3,4,6-Tetrachlorophenol	58-90-2	1.10E+02	nc	1.1E+02	nc	1.10E+02	Υ V	Ϋ́		
Diethylphthalate	84-66-2	2.92E+03	nc	2.92E+03	nc	2.92E+03	¥	1.50E+04	_ +	1.50E+04





Appendix C: Health-Based Screening Levels and Acute Toxicity Values

			For the	Chronic EVE	For the Chronic Evaluation (HBSL	SL)		For the Acute Evaluation (AIV)	te Evaluat	ion (AIV)
Compound	CAS#	Region 9 PRG	Toxicity Endpoint	Region 3 RBC	Toxicity Endpoint	Health-based Screening Level	ERPG	TEEL	Source	Acute Toxicity Value
		(µg/m³)	(c or nc)	(µg/m³)	(c or nc)	(µg/m³)	(µg/m³)	(µg/m³)	(T or E)	(µg/m³)
4-Chlorophenylphenyl ether	7005-72-3	NA		NA		NA	NA	NA		
Fluorene	86-73-7	1.46E+02	nc	1.46E+02	nc	1.46E+02	NA	7.50E+04	-	7.50E+04
5-Nitro-o-toluidine	99-55-8	2.00E-01	C	1.9E-01	S	2.00E-01	AN	ΑN		
4-Nitroaniline	100-01-6	AN		AN		NA	۸A	9.00E+03	⊢	9.00E+03
4,6-Dinitro-2-methylphenol	534-52-1	NA		3.7E-01	nc	3.65E-01	۲	5.00E+02	-	5.00E+02
Diphenylamine/N-NitrosoDPA	62-75-9	NA		NA		NA	AN	2.50E+03	⊢	2.50E+03
sym-Trinitrobenzene	99-35-4	1.10E+02	nc	1.10E+02	nc	1.10E+02	Ϋ́	3.00E+04	T	3.00E+04
Diallate	2303-16-4	1.10E-01	၁	NA		1.10E-01	ΑΝ	Α		
Phenacetin	62-44-2	NA		NA		NA	ΑN	3.00E+04	-	3.00E+04
4-Bromophenylphenyl ether	101-55-3	NA		NA		NA	NA	NA		
Hexachlorobenzene	118-74-1	4.18E-03	၁	3.91E-03	၁	4.18E-03	ΑN	7.50E+01	_	7.50E+01
4-Aminobiphenyl	92-67-1	NA		NA		NA	Ϋ́	1.50E+03	_	1.50E+03
Pronamide	23950-58-5	2.74E+02	nc	NA		2.74E+02	۸	Ϋ́		
Pentachlorophenol	87-86-5	5.60E-02	၁	5.22E-02	S	5.60E-02	ΑĀ	1.50E+03	-	1.50E+03
Pentachloronitrobenzene	82-68-8	2.59E-02	ပ	2.41E-02	O	2.59E-02	ΑA	1.50E+03	 - -	1.50E+03
Phenanthrene	85-01-8	NA		NA		NA	Ν	2.00E+03		2.00E+03
Anthracene	120-12-7	1.10E+03	nc	1.1E+03	nc	1.10E+03	NA	6.00E+03	-	6.00E+03
Carbazole	86-74-8	3.36E-01	၁	3.13E-01	0	3.36E-01	NA	NA		
Di-n-butylphthalate	84-74-2	3.65E+02	nc	3.65E+02	nc	3.65E+02	AN	1.50E+04	⊢	1.50E+04
4-Nitroquinoline-1-oxide	56-57-5	NA V		NA		NA	NA	ΑN		
Methapyrilene	91-80-5	NA	•	NA		NA	NA	ΑN		
Fluoranthene	206-44-0	1.50E+02	uc	1.5E+02	nc	1.50E+02	NA	3.00E+01	⊥	3.00E+01
Benzidine	92-87-5	2.90E-05	ပ	NA		2.90E-05	NA	5.00E+02	T	5.00E+02
Pyrene	129-00-0	NA		NA		NA	Α	1.50E+04	Τ	1.50E+04
p-Dimethylaminoazobenzene	60-11-7	NA		NA		NA	ΑĀ	7.50E+04		7.50E+04
Chlorobenzilate	510-15-6	2.49E-02	၁	2.32E-02	S	2.49E-02	ΑN	2.50E+02		2.50E+02
Kepone	143-50-0	3.74E-04	υ	NA		3.74E-04	NA	1.00E+02		1.00E+02
Butylbenzylphthalate	85-68-7	7.30E+02	nc	7.30E+02	nc	7.30E+02	NA	5.00E+05	T	5.00E+05
3,3'-Dimethylbenzidine	119-93-7	7.30E-04	၁	6.8E-04	O	7.30E-04	NA	3.00E+00	T	3.00E+00
2-Acetylaminofluorene	53-96-3	NA		NA		NA	NA	2.50E+03		2.50E+03
bis(2-Ethylhexyl)phthalate	117-81-7	4.80E-01	ပ	4.47E-01	ပ	4.80E-01	NA	1.00E+04	Τ	1.00E+04
3,3'-Dichlorobenzidine	91-94-1	1.50E-02	S	1.4E-02	ပ	1.50E-02	ΑN	6.21E+03	T	6.21E+03
Benz(a)anthracene	56-55-3	2.20E-02	ပ	8.6E-03	U	2.20E-02	AN	6.00E+02	T	6.00E+02
Chrysene	218-01-9	2.17E+00	O	8.58E-01	U	2.17E+00	Ϋ́	2.00E+02	Τ	2.00E+02
Di-n-octylphthalate	117-84-0	7.30E+01	nc	7.30E+01	nc	7.30E+01	A A	1.50E+05	⊢	1.50E+05
7,12-Dimethylbenz(a)anthracene	9-26-29	¥		Y N		₹Z	¥	ΔN		

Appendix C: Health-Based Screening Levels and Acute Toxicity Values

			For the	For the Chronic Evaluation (HBSL	luation (HB	SL)		For the Acute Evaluation (ATV)	e Evaluati	ion (ATV)
Compound	cas#	Region 9 PRG (µg/m³)	Toxicity Endpoint (c or nc)	Region 3 RBC (µg/m³)	Toxicity Endpoint (c or nc)	Health-based Screening Level (ug/m²)	ERPG (ug/m³)		Source (T or E)	Acute Toxicity Value (tig/m3)
Benzo(b)fluoranthene	205-99-2	2.20E-02	S	8.6E-03	ပ	2.20E-02	Ϋ́	ΑN		
Benzo(k)fluoranthene	207-08-9	2.20E-01	o	8.6E-02	ပ	2.20E-01	A A	ΑN		
Benz(a)pyrene	50-32-8	2.20E-03	ပ	2.0E-03	O	2.20E-03	A A	7.50E+03	-	7.50E+03
3-Methylcholanthrene	56-49-5	NA NA		AN		NA	AA	1.50E+03	_	1.50E+03
Indeno(1,2,3-cd)pyrene	193-39-5	2.17E-02	υ	8.58E-03	ပ	2.17E-02	AA	ΝΑ		
Dibenz(a,h)anthracene	53-70-3	2.17E-03	O	8.58E-04	ပ	2.17E-03	Ą	3.00E+04	-	3.00E+04
Benzo(g,h,i)perylene	191-24-2	NA		NA		NA	¥	3.00E+04	-	3.00E+04
- cotoctoc										

Footnotes:

PRG: Preliminary Remediation Goals

c: Cancer

nc:non-cancer

RBC: Risk-Based Concentration

HBSL: Health-based Screening Level

(E) ERPG: Emergency Response Planning Guidelines (T) TEEL: Temporary Emergency Exposure Limits

ATV: Acute Toxicity Value NA: Not available

APPENDIX D RISK EVALUATION DATA

Table D-1: Comparison of Air Concentrations With Health-Based Values: Metals, Particulates and Miscellaneous Compounds

			Sign	nal IIIum	Signal Illumination M159			
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асите} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 13
TSP	5.28E-02	5.00E+01	1.06E-03	no	ΨN	NA		na
PM ₁₀	3.02E-02	5.00E+01	6.04E-04	no	ΑN	NA		na
HCI (a)	NA	2.08E+01		na	AN	7.14E+03		na
Cl ₂ (a)	2.14E-05	2.09E-01	1.02E-04	OU	1.87E-02	2.89E+03	6.47E-06	ou
Dioxin TEQ (b)	9.80E-14	4.48E-08	2.19E-06	no	8.01E-10	3.50E+00	2.29E-10	ou
Carbon Monoxide (CO)	4.38E-03	1.57E+02	2.79E-05	no	3.83E+00	2.30E+05	1.67E-05	Ou
Nitrogen Oxide (NOx)	1.51E-03	1.00E+02	1.51E-05	no	5.29E+00	2.70E+05	1.96E-05	2
HCI (a)	6.42E-04	2.08E+01	3.08E-05	no	2.25E+00	7.14E+03	3.15E-04	20
Carbon Dioxide (CO ₂)	1.08E-01	N		na	3.78E+02	5.40E+07	7.00E-06	DO.
Sulfur Dioxide (SO ₂)	4.52E-05	8.00E+01	5.65E-07	no	3.96E-02	7.89E+02	5.02E-05	ou
Aluminum	6.39E-05	3.65E+00	1.75E-05	no	2.24E-01	3.00E+04	7.47E-06	01
Antimony	NA	1.46E+00		na	NA	1.50E+03		na
Arsenic	NA	4.47E-04		na	NA	3.00E+01		na
Barium	2.93E-03	5.21E-01	5.62E-03	no	1.03E+01	1.50E+03	6.85E-03	on On
Beryllium	NA	8.00E-04		na	NA	5.00E+00		na
Cadmium	3.90E-08	1.07E-03	3.66E-05	no	3.19E-04	3.00E+01	1.06E-05	on On
Chromium	7.55E-07	1.53E-04	4.94E-03	no	6.17E-03	1.50E+03	4.11E-06	on
Cobalt	6.53E-07	2.20E+02	2.97E-09	no	2.29E-03	6.00E+01	3.82E-05	ou
Copper	4.95E-06	1.46E+02	3.39E-08	no	1.73E-02	3.00E+03	5.78E-06	OU
Lead	2.32E-06	1.50E+00	1.55E-06	no	8.13E-03	1.50E+02	5.42E-05	no
Magnesium	2.13E-02	N		na	7.47E+01	3.00E+04	2.49E-03	OU
Manganese	1.83E-05	5.11E-02	3.58E-04	no	6.40E-02	3.00E+03	2.13E-05	OU
Nickel	3.52E-07	7.30E+01	4.82E-09	no	1.23E-03	3.00E+03	4.11E-07	OL OL
Phosphorus	2.43E-06	N		na	8.53E-03	3.00E+02	2.84E-05	OL OL
Selenium	NA	1.83E+01		na	NA	6.00E+02		na
Silver	4.92E-14	1.83E+01	2.70E-15	no	1.73E-04	3.00E+02	5.75E-07	OU
Thallium	NA	2.56E-01		na	NA	3.00E+02		na
Zinc	3.98E-05	1.10E+03	3.64E-08	no	1.39E-01	3.00E+04	4.65E-06	no
Mercury	2.20E-14	3.13E-01	7.04E-14	no	7.72E-05	1.00E+02	7.72E-07	no
Footnote: (a) HCI/Cl. levels were too low to be reliably measured	olv measured							

(a) HCI/Cl₂ levels were too low to be reliably measured.

(b) Presence questionable - reported at similar levels in samples and blanks.

NA = Not applicable because compound was not detected.

na = Not available because health-based screening value is not available or not applicable if compound was not detected.

NV = No value

 C_{chronic} = Chronic time-averaged concentration; HBSL = Chronic health-based screening level C_{acute} = Acute concentration; ATV = Acute toxicity value

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

Cerronic (Lig/m³) Cerr				Si	gnal Illumi	Signal Illumination M159	6		
MMHC) NV na 1.06E-05 NV na 3.50E-05 NV na 1.78E-05 NV na 1.78E-05 NV na 1.58E-05 NV na 1.58E-05 NV na 1.58E-06 NV na 1.33E-06 NV na 1.35E-06 NV na 1.35E-06 NV na 1.35E-06 NV na 1.35E-06 NV na 1.55E-06 NV na 1.55E-07 NV na A.22E-07 NV na NA NV na 2.81E-07 NV na NA NV na A.22E-07 NV na <	Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 15	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	× 1?
1.49E-04 NV na 1.06E-05 NV na 3.50E-05 NV na 1.78E-05 NV na 1.78E-05 NV na 1.58E-05 NV na 1.58E-05 NV na 1.58E-06 NV na 1.33E-06 3.74E-03 3.55E-04 no 1.55E-06 NV na na 1.55E-06 NV na na 1.55E-07 NV na na 2.81E-07 NV na na 1.41E-07	I Nonmethane Hydrocarbons (TNI	MHC)							
1.06E-05 NV na 3.50E-05 NV na 1.78E-05 NV na 1.58E-05 NV na 1.58E-05 NV na 1.83E-06 NV na 1.83E-06 NV na 1.33E-06 NV na 1.35E-07 NV na 1.55E-07 NV na NA NV na 1.55E-07 NV na NA NV na 1.41E-07 NV na NA na na NA na NA na NA	TNMHC	1.49E-04	N		na	ΝΑ	ΝΑ		na
1.06E-05 NV na 3.50E-05 NV na 1.78E-05 NV na 1.58E-05 NV na 1.58E-05 NV na 1.58E-05 NV na 1.58E-06 NV na 1.83E-06 NV na 1.33E-06 NV na 1.33E-06 NV na NA NV na 1.55E-06 NV na NA NV na 4.22E-07 NV na NA NV na 1.41E-07 NV na NA NV na NA NV na NA na na NA na na NA na na<	atile Organic Compounds (VOCs)								
3.50E-05 NV na 1.78E-05 NV na 2.53E-06 NV na 1.58E-05 NV na 1.83E-06 NV na 1.83E-06 NV na 1.33E-06 NV na 1.33E-06 3.74E-03 3.55E-04 no NA NV na 1.55E-06 NV na NA NV na 1.55E-06 NV na NA NV na 1.41E-07 NV na NA NV na NA na NA na NA na 1.41E-07 NV na NA na NA	Ethane	1.06E-05	N/		na	ΨN	AN		na
1.78E-05 NV na 2.53E-06 NV na 1.58E-05 NV na 1.83E-06 NV na 2.96E-06 NV na 1.33E-06 NV na 1.33E-06 NV na 1.55E-06 NV na 1.55E-07 NV na 1.55E-07 NV na NA NV na NA NV na NA NV na 1.55E-07 NV na NA NV na A.22E-07 NV na NA NV na A.22E-07 NV na NA NV na A.22E-07 NV na A.22E-07 NV na NA NV na A.22E-07 NV na NA NV na NA NV na NA NV na NA NV<	Ethylene	3.50E-05	NN		na	1.23E-01	4.60E+05	2.66E-07	ou
2.53E-06 NV na 1.58E-05 NV na NA NV na 1.83E-06 NV na 2.96E-06 NV na 1.33E-06 NV na 1.35E-06 NV na NA NV na 1.55E-07 NV na NA NV na A.22E-07 NV na NA na na NA na na <td>Acetylene</td> <td>1.78E-05</td> <td>NN</td> <td></td> <td>na</td> <td>NA</td> <td>NA</td> <td></td> <td>na</td>	Acetylene	1.78E-05	NN		na	NA	NA		na
1.58E-05 NV Na	Propane	2.53E-06	NN		na	8.88E-03	3.78E+06	2.35E-09	ou
NA NV na 1.83E-06 NV na 2.96E-06 NV na 1.33E-06 3.74E-03 3.55E-04 no 1.55E-06 NV na 1.55E-07 NV na 2.81E-07 NV na NA NV na A.22E-07 NV na NA NV	Propene	1.58E-05	NV		na	NA	NA		na
1.83E-06 NV na 2.96E-06 NV na 1.33E-06 3.74E-03 3.55E-04 no 1.55E-06 NV na 1.55E-06 NV na 2.85E-07 NV na A.22E-07 NV na NA NV na NA NV na NA NV na A.22E-07 NV na NA NV na A.22E-07 NV na NA NV na A.22E-07 NV na NA NV na NA NV na A.22E-07 NV na NA NV na A.22E-07 NV na NA NV na A.241E-07 NV na NA NV na NA na na NA na na NA na na NA	i-Butane	AN	NV		na	NA	5.71E+06		na
2.96E-06 NV na 1.33E-06 3.74E-03 3.55E-04 no NA NV na 1.55E-06 NV na 9.85E-07 NV na 7.74E-07 NV na NA NV na NA NV na NA NV na NA NV na 2.81E-07 NV na NA NV na A.22E-07 NV na NA na na NA na na	i-Butene	1.83E-06	N<		na	NA	NA		na
1.33E-06 3.74E-03 3.55E-04 no NA NV na NV na NV na NV na NV NV na NA NV na NV NV na NV NV NV NV NA NV NA NV NA NV NA NA NV NA NA NV NA NA NA NV NA NA NA NA NV NA	1-Butene	2.96E-06	N<		na	NA	NA		na
NA NV 1.55E-06 NV 9.85E-07 NV 7.74E-07 NV 4.22E-07 NV 2.81E-07 NV NA NV NA NV 2.81E-07 NV 4.22E-07 NV NA NV	1,3-Butadiene	1.33E-06	3.74E-03	3.55E-04	ou	2.71E-03	2.20E+04	1.23E-07	2
1.55E-06 NV 9.85E-07 NV 7.74E-07 NV 4.22E-07 NV 2.81E-07 NV NV NA NV 2.11E-07 NV 4.22E-07 NV NV 2.11E-07 NV NV NA NV NV NA NV	n-Butane	NA	N		na	NA	5.71E+06		na
9.85E-07 NV 7.74E-07 NV 4.22E-07 NV 2.81E-07 NV NA NV NA NV 2.81E-07 NV A.22E-07 NV 4.22E-07 NV A.22E-07 NV A.24E-07 NV A.26E-07 NV A.27E-07 NV NA NV	trans-2-Butene	1.55E-06	N		na	NA	NA		na
7.74E-07 NV 4.22E-07 NV NV 2.81E-07 NV NV NA NV NA NV 2.81E-07 NV A.22E-07 NV 4.22E-07 NV NV NA NV	2,2-Dimethylpropane	9.85E-07	N<		na	NA	NA		na
4.22E-07 NV NA NV 2.81E-07 NV 2.81E-07 NV NA NV 2.11E-07 NV 4.22E-07 NV A.22E-07 NV	cis-2-Butene	7.74E-07	>N		na	NA	NA		na
2.81E-07 NV 2.81E-07 NV NA NV NA NV 2.11E-07 NV 4.22E-07 NV NV NA NV	3-Methyl-1-butene	4.22E-07	N		na	NA	NA		na
2.81E-07 NV 2.81E-07 NV NA NV NA NV 2.11E-07 NV 4.22E-07 NV NA NV	i-Pentane	Ϋ́	≥ N		na	NA	1.80E+06		na
2.81E-07 NV NA NV NA NV 2.11E-07 NV 4.22E-07 NV NA NV	1-Pentene	2.81E-07	N		na	NA	NA		na
NA NV NA NV 2.11E-07 NV 2.81E-07 NV 4.22E-07 NV NA NV	2-Methyl-1-butene	2.81E-07	>N		na	NA	NA		na
2.11E-07 NV 2.81E-07 NV 4.22E-07 NV NA NV 2.11E-07 NV NA NV	n-Pentane	AN AN	Ž		na	NA	1.80E+06		na
2.11E-07 NV 2.81E-07 NV 4.22E-07 NV NA NV 2.11E-07 NV NA NV NA NV 1.41E-07 NV NA NV NA NV	Isoprene	AN	>N		na	ΝΑ	NA		na
2.81E-07 NV 4.22E-07 NV NA NV 2.11E-07 NV NA NV NA NV NA NV NA NV NA NV NA NV	trans-2-Pentene	2.11E-07	N N		na	ΔA	NA		na
4.22E-07 NV NA NV NV S.11E-07 NV	cis-2-Pentene	2.81E-07	2		na	NA	NA		na
2.11E-07 NV NV NV NA NV	2-Methyl-2-butene	4.22E-07	N		na	NA	NA		na
2.11E-07 NV NV NA NV	2,2-Dimethylbutane	NA	N		na	AN	1.80E+06		na
1.41E-07 NV NV NV NV NA NA	Cyclopentene	2.11E-07	N N		na	NA	NA		na
1.41E-07 NV NV NA NV	4-Methyl-1-pentene	Ϋ́	2		na	NA	NA		na
NA NA	Cyclopentane	1.41E-07	2		na	NA	NA		na
	2,3-Dimethylbutane	ΑΝ	2		na	NA	AN		na
NA NA	cis-4-Methyl-2-pentene	NA NA	N		na	AN	NA		na





Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

			Si	gnal IIIum	Signal Illumination M159	6		
Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 1?
2-Methylpentane	NA	NN		na	AN	1.80E+06		na
3-Methylpentane	3.52E-07	NV		na	NA	NA		na
2-Methyl-1-pentene	NA	NΛ		na	NA	NA		na
1-Hexene	3.52E-07	NV		na	1.23E-03	1.03E+05	1.20E-08	OU
n-Hexane	NA	2.10E+02		na	AN	5.28E+05		na
trans-2-Hexene	NA	NV		na	NA	NA		па
2-Methyl-2-pentene	NA	NV		na	NA	NA		na
cis-2-Hexene	NA	NV		na	NA	NA		na
Methylcyclopentane	2.81E-07	NV		na	NA	NA		na
2,4-Dimethylpentane	NA	NV		na	NA	NA		na
Benzene	4.49E-06	2.50E-01	1.80E-05	ou	9.18E-03	1.56E+05	5.89E-08	ou
Cyclohexane	NA	NV	1	na	NA	3.10E+06		na
2-Methylhexane	1.41E-07	NV		na	NA	AN		na
2,3-Dimethylpentane	NA	NV		na	NA	NA		na
3-Methylhexane	AN	NV		na	NA	NA		na
2,2,4-Trimethylpentane	2.11E-07	N		na	7.40E-04	3.50E+05	2.11E-09	no
n-Heptane	1.41E-07	N		na	4.93E-04	1.80E+06	2.73E-10	no
2,4,4-Trimethyl-1-pentene	AA	N		na	NA	NA		na
Methylcyclohexane	A A	3.10E+03		na	AA	4.81E+06		na
2,4,4-Trimethyl-2-pentene	A A	NV		na	AA	NA		na
2,5-Dimethylhexane	1.41E-07	N		na	ΑΝ	NA		na
2,4-Dimethylhexane	1.41E-07	2		na	AA	NA		na
2,3,4-Trimethylpentane	2.11E-07	NV		na	NA	NA		na
Toluene	3.87E-06	4.02E+02	9.64E-09	no	3.39E-03	1.88E+05	1.81E-08	no
2,3-Dimethylhexane	Ϋ́	N<		na	NA	NA		na
2-Methylheptane	1.41E-07	<u>N</u>		na	NA	NA		na
3-Ethylhexane	ΑΝ	N		na	NA	NA		na
2,2-Dimethylheptane	Ϋ́	NV		na	NA	NA		na
2,2,4-Trimethylhexane	Ϋ́	>N		na	NA	NA		na
n-Octane	3.52E-07	2		na	ΝΑ	NA		na
Ethylcyclohexane	AN	№		na	NA	NA		na
Ethylbenzene	1.41E-06	1.10E+03	1.28E-09	no	4.93E-03	5.43E+05	9.09E-09	no

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

			Si	gnal Illumi	Signal Illumination M159	6		
Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	G _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	> 1?
m-Xylene & p-Xylene	4.08E-06	N		na	1.43E-02	6.51E+05	2.20E-08	no
Styrene	9.85E-07	1.10E+03	8.96E-10	no	8.63E-04	2.13E+05	4.05E-09	no
o-Xylene	8.44E-07	7.30E+03	1.16E-10	ou	2.96E-03	6.51E+05	4.54E-09	ou
n-Nonane	6.33E-07	4.02E+02	1.58E-09	ou	2.22E-03	1.05E+06	2.12E-09	ou
i-Propylbenzene	NA	4.00E+02		na	NA	NA		na
n-Propylbenzene	1.41E-07	3.65E+01	3.86E-09	no	NA	AN		na
p-Ethyltoluene	4.93E-07	NV		na	1.73E-03	1.25E+05	1.38E-08	no
m-Ethyltoluene	2.11E-07	NV.		na	AN	ΑN		na
1,3,5-Trimethylbenzene	1.41E-07	6.20E+00	2.27E-08	ou	4.93E-04	3.68E+05	1.34E-09	no
o-Ethyltoluene	1.41E-07	NV		na	4.93E-04	7.50E+02	6.58E-07	ou
1,2,4-Trimethylbenzene & sec- Butylbenzene	2.81E-07	6.21E+00	4.54E-08	no	9.86E-04	1.80E+05	5.48E-09	ou
n-Decane	NA	N/		na	ΑN	4.37E+03		na
alpha-Pinene	NA	N		na	AN	4.00E+04		na
beta-Pinene	NA	NV		na	NA	NA		na
delta 3-Carene	NA	N/		na	NA	NA		na
d-Limonene	NA	NV		na	NA	1.95E+06		na
MTBE	NA	3.10E+03		na	NA	4.32E+05		na
Dichlorodifluoromethane	9.66E-09	2.10E+02	4.60E-11	ou	3.38E-05	1.48E+07	2.28E-12	no
Methylchloride	Ϋ́	≥	·	na	NA	NA		na
Dichlorotetrafluoroethane	A A	2		na	NA	NA		na
Chloroethene	A A	2.20E-02		na	NA	1.28E+04		na
1,3-Butadiene	1.35E-06	3.74E-03	3.61E-04	OL	2.76E-03	2.20E+04	1.25E-07	no
Methylbromide	Ϋ́	5.20E+00		na	NA	5.82E+04		na
Ethylchloride	A V	2.30E+00		na	NA	7.92E+06		na
Trichloromonofluoromethane	1.65E-07	7.30E+02	2.26E-10	no	5.77E-04	2.81E+06	2.06E-10	ou
Vinylidenechloride	AN	NV		na	NA	7.92E+04		na
Methylenechloride	4.94E-06	4.10E+00	1.21E-06	no	1.01E-02	6.96E+05	1.45E-08	no
Allytchloride	A	1.00E+00		na	NA	9.39E+03		na
1,1,2-Trichloro-1,2,2-trifluoroethane	5.16E-08	3.13E+04	1.65E-12	ou	1.81E-04	9.58E+06	1.89E-11	no
1,1-Dichloroethane	ΑĀ	5.21E+02		na	Υ	1.21E+06		na
1,2-Dichloroethene	NA	3.29E+01		na	A V	2.38E+06		na





Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

Compound (a) Convolc (µg/m³) Connect (µg/m³) Heatth-Based (µg/m³) Connect (µg/m³) Value (µg/m³) Val				Si	gnal IIIum	Signal Illumination M159	6		
NA 7.38E-02 na NA 8.40E-02 na NA 7.38E-02 na NA 7.38E-06 1.00E+03 2.58E-11 no 9.03E-05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0	Compound (a)	С _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	× 13	С _{асиtе} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 1?
NA 7.39E-02 na NA 2.58E-08 1.00E+03 2.58E-11 no 9.03E-05 4.57E-06 2.50E-01 1.83E-05 no 3.74E-02 6.70E-08 1.04E+03 6.43E-11 no 3.74E-05 NA 1.12E+00 na NA NA NV na NA NA NV na NA NA 1.20E-01 na NA NA 1.20E-02 9.80E-09 no 3.45E-03 NA NA NA NA NA NA 1.20E-01 na NA NA NA 1.00E-02 9.80E-09 no 3.45E-03 NA 1.20E-04 1.96E-09 no 1.45E-02 4.15E-06 1.06E+03 1.47E-10 no 1.76E-03 5.01E-07 1.00E+03 9.47E-10 no 1.76E-03 6.21E+06 1.06E+03 9.47E-10 no 1.76E-03 6.21E+00 1.06E+03 1.46E-09 no 1.00E-03 NA <th>Chloroform</th> <th>NA</th> <th>8.40E-02</th> <th></th> <th>na</th> <th>AN</th> <th>9.76E+03</th> <th></th> <th>na</th>	Chloroform	NA	8.40E-02		na	AN	9.76E+03		na
2.58E-08 1.00E+03 2.58E-11 no 9.03E-05 4.57E-06 2.50E-01 1.83E-05 no 3.74E-02 NA 9.89E-02 na NA NA 1.12E+00 na NA NA NV na NA NA 1.20E-01 na NA NA 1.00E+02 9.80E-09 no 3.45E-03 NA 1.00E-06 1.00E+03 1.96E-09 no 1.45E-03 1.00E-06 1.00E+03 1.96E-09 no 1.45E-03 1.00E-06 1.00E+03 1.96E-09 no 1.45E-03 1.00E-06 1.00E+03 1.18E-09 no 1.45E-03 1.00E-06 1.00E+03 1.18E-09 no 1.00E-03 NA 1.00E-06 <td>1,2-Dichloroethane</td> <td>NA</td> <td>7.39E-02</td> <td></td> <td>na</td> <td>ΝΑ</td> <td>8.08E+03</td> <td></td> <td>na</td>	1,2-Dichloroethane	NA	7.39E-02		na	ΝΑ	8.08E+03		na
4.57E-06 2.50E-01 1.83E-05 no 3.74E-02 6.70E-08 1.04E+03 6.43E-11 no 5.87E-05 NA 1.12E+00 na NA NA 1.12E+00 na NA NA 1.20E-01 na NA NA 1.20E-01 na NA NA 1.20E-02 9.80E-09 no 3.45E-03 NA 1.20E-01 na NA NA 1.20E-01 na NA NA 1.20E-02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 8.73E-03 na NA NA 8.73E-03 no 1.45E-03 1.00E-06 1.00E+03 no 1.45E-02 1.00E-06 1.00E+03 no 1.45E-02 1.00E-07 1.00E+03 no 1.00E-03 1.43E-07 6.21E+00 2.31E-09 no 1.00E-03 1.43E-07 6.21E+00 2.31E-08 no 1.00E-03 NA NA <td>Methylchloroform</td> <td>2.58E-08</td> <td>1.00E+03</td> <td>2.58E-11</td> <td>no</td> <td>9.03E-05</td> <td>1.91E+06</td> <td>4.74E-11</td> <td>OU</td>	Methylchloroform	2.58E-08	1.00E+03	2.58E-11	no	9.03E-05	1.91E+06	4.74E-11	OU
6.70E-08 1.04E+03 6.43E-11 no 5.87E-05 NA 9.89E-02 na NA NA 1.12E+00 na NA NA 1.20E-01 na NA NA 1.20E-01 na NA NA 1.20E-02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 8.73E-03 na NA NA 8.73E-03 no 3.45E-03 NA 8.73E-03 na NA NA 8.73E-03 no 1.45E-02 1.00E-06 1.00E+03 1.96E-09 no 1.45E-02 1.00E-06 1.00E+03 1.96E-09 no 1.45E-02 1.00E-06 1.00E+03 1.96E-09 no 1.45E-02 1.00E-06 1.00E+03 1.18E-09 no 1.76E-03 1.43E-07 6.21E+00 2.31E-08 no 1.00E-03 NA 4.00E-02 1.18E-09 <td< td=""><td>Benzene</td><td>4.57E-06</td><td>2.50E-01</td><td>1.83E-05</td><td>ou</td><td>3.74E-02</td><td>1.60E+05</td><td>2.34E-07</td><td>no</td></td<>	Benzene	4.57E-06	2.50E-01	1.83E-05	ou	3.74E-02	1.60E+05	2.34E-07	no
NA 9.89E-02 na NA NA 1.12E+00 na NA NA 1.12E+00 na NA NA 1.20E-01 na NA NA 1.20E-01 na NA NA 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 8.73E-03 na NA NA 6.20E+02 no 7.57E-03 1.00E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 7.57E-03 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 NA 3.31E-02 na NA 1.76E-03 5.01E-07 NV na 1.06E-03 1.06E-03 1.43E-07 6.21E+00 4.61E-08 no 1.06E-03 NA 3.30E+00 4.61E-08 no 1.06E-03 NA 2.86E-07 6.21E+00	Carbontetrachloride	6.70E-08	1.04E+03	6.43E-11	ou	5.87E-05	1.28E+05	4.59E-10	no
NA 1.12E+00 na NA NA NV na NA NA 1.20E-01 na NA NA 1.20E-01 na NA 3.94E-06 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 3.31E+00 na NA A 15E-06 1.00E+03 1.96E-09 no 1.45E-02 1.00E-06 1.00E+03 1.96E-09 no 1.45E-02 1.00E-06 1.00E+03 9.47E-10 no 8.78E-04 1.00E-06 1.00E+03 9.47E-10 no 1.45E-02 1.00E-06 1.00E+03 9.47E-10 no 1.45E-03 1.00E-06 1.00E+03 9.47E-10 no 1.76E-03 1.00E-07 NV na 1.00E-03 NA 3.30E+02 1.18E-09 no 1.00E-03 NA 3.30E+00 1.00E-03 1.00E-03 NA NA	1,2-Dichloropropane	NA	9.89E-02		na	AN	5.08E+05		na
NA NV na NA NA NV na NA NA 1.20E-01 na NA 3.94E-06 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 8.73E-03 na NA NA 8.73E-03 na NA NA 6.20E+01 na NA 1.00E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 NA 3.31E-02 na 1.76E-03 1.43E-07 7.30E+02 1.18E-09 no 1.00E-03 NA 4.00E-02 1.18E-09 no 1.00E-03 NA A.00E-02 1.03 NA NA NA NA 3.30E+00 4.61E-08 no 1.00E-03 NA NA 1.30E+02	Trichloroethylene	NA	1.12E+00		na	AN	5.37E+05		na
NA NV na NA NA 1.20E-01 na NA 3.94E-06 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 3.31E+00 na NA NA 3.31E+00 na NA NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 NA 3.31E-02 na 1.45E-02 1.05E+03 no 1.45E-02 1.06E+03 9.47E-10 no 8.78E-04 NA 1.30E+02 1.18E-09 no 1.46E-03 5.01E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 1.30E+02 na NA NA NA 1.00E-02 na NA <t< td=""><td>cis 1,3-Dichloro-1-propene</td><td>NA</td><td>N</td><td></td><td>na</td><td>NA</td><td>1.14E+04</td><td></td><td>na</td></t<>	cis 1,3-Dichloro-1-propene	NA	N		na	NA	1.14E+04		na
NA 1.20E-01 na NA 3.94E-06 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E+02 9.80E-09 no 3.45E-03 NA 8.73E+00 na NA NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 1.06E+03 9.47E-10 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 NA 3.31E-02 na 1.76E-03 NA 3.31E-02 na 1.76E-03 NA 3.31E-02 na 1.76E-03 NA 4.06E-02 1.08E-09 no 1.00E-03 NA 4.00E-02 1.08E-09 na NA NA NA 3.30E+00 na NA NA NA 1.30E+02 na NA NA 1.30E-02 na NA NA NA 1.30E+02 1.08E-09 na NA NA 1.30E+02	trans 1,3-Dichloro-1-propene	NA	NV		na	NA	AN		na
3.94E-06 4.02E+02 9.80E-09 no 3.45E-03 NA 8.73E-03 na NA NA 3.31E+00 na NA NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 NA 3.31E-02 na NA 8.59E-07 7.30E+02 1.18E-09 no 1.76E-03 NA 3.31E-02 na 1.76E-03 NA 4.00E-02 na 1.00E-03 NA 4.00E-02 na NA NA 2.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 2.80E-01 na NA NA 2.09E+02 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA <td>1,1,2-Trichloroethane</td> <td>NA</td> <td>1.20E-01</td> <td></td> <td>na</td> <td>NA</td> <td>1.64E+05</td> <td></td> <td>na</td>	1,1,2-Trichloroethane	NA	1.20E-01		na	NA	1.64E+05		na
NA 8.73E-03 na NA NA 3.31E+00 na NA NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 NA 3.31E-02 1.18E-09 no 1.45E-02 8.59E-07 7.30E+02 1.18E-09 no 1.76E-03 NA 3.31E-02 1.18E-09 no 1.06E-03 1.43E-07 NV NA 1.00E-03 NA 4.00E-02 1.00E-03 no 1.00E-03 NA 3.30E+00 4.61E-08 no 1.00E-03 NA 2.80E-01 0.21E+00 4.61E-08 no 1.00E-03 NA 3.30E+02 na NA NA NA 7.30E+01 na NA NA 7.30E+01 na NA	Toluene	3.94E-06	4.02E+02	9.80E-09	ou	3.45E-03	1.88E+05	1.84E-08	ou
NA 3.31E+00 na NA NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 NA 3.31E-02 1.18E-09 no 1.45E-04 8.59E-07 7.30E+02 1.18E-09 no 3.01E-03 NA 1.43E-07 NV na 1.76E-03 1.43E-07 6.21E+00 2.31E-08 no 1.06E-03 NA 4.00E-02 1.00 1.00E-03 NA 1.00E-02 na NA NA 2.80E-07 4.61E-08 no 1.00E-03 NA NA 2.80E-07 1.00E-02 na NA NA NA 2.80E-04 1.00E-03 NA NA 1.30E+01 1.00	1,2-Dibromoethane	NA	8.73E-03		na	NA	1.54E+05		na
NA 6.20E+01 na NA 2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 1.45E-02 NA 3.31E-02 1.18E-09 no 1.45E-02 5.01E-07 7.30E+02 1.18E-09 no 3.01E-03 1.43E-07 6.21E+00 2.31E-08 no 1.06E-03 NA 4.00E-02 na NA NA 3.30E+00 na NA NA NA NA NA NA 7.30E+02 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA	Perchloroethylene	NA	3.31E+00		na	NA	6.89E+05		na
2.16E-06 1.10E+03 1.96E-09 no 7.57E-03 4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 1.00E-07 7.30E+02 1.18E-09 no 8.78E-04 1.43E-07 6.21E+00 2.31E-08 no 1.76E-03 1.43E-07 6.21E+00 2.31E-08 no 1.00E-03 NA 4.00E-02 na NA NA 3.30E+00 na NA NA 1.00E-03 na NA NA 2.09E+02 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA	Chlorobenzene	NA	6.20E+01		na	NA	1.38E+05		na
4.15E-06 7.30E+02 5.69E-09 no 1.45E-02 1.00E-06 1.00E+03 9.47E-10 no 8.78E-04 1.00E-06 1.00E+02 9.47E-10 no 8.78E-04 1.00E-07 7.30E+02 1.18E-09 no 3.01E-03 8.59E-07 7.30E+02 1.18E-09 no 3.01E-03 1.43E-07 6.21E+00 2.31E-08 no 1.00E-03 NA 4.00E-02 na NA NA 2.80E-01 na NA NA 2.09E+02 na NA NA NA NA NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA NA NA NA NA	Ethylbenzene	2.16E-06	1.10E+03	1.96E-09	ou	7.57E-03	4.34E+03	1.74E-06	ou
1.00E-06 1.06E+03 9.47E-10 no 8.78E-04 NA 3.31E-02 na NA NA S.01E-03 no 3.01E-03 no 5.01E-03 no 5.01E-03 no 5.01E-03 no 5.01E-03 no 5.02E-04 no 1.00E-03 no NA	m&p-Xylene	4.15E-06	7.30E+02	5.69E-09	ou	1.45E-02	6.51E+05	2.23E-08	on
NA 3.31E-02 na NA 8.59E-07 7.30E+02 1.18E-09 no 3.01E-03 5.01E-07 NV na 1.76E-03 1.43E-07 6.21E+00 2.31E-08 no 5.02E-04 1.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 2.80E-01 na NA NA 2.80E-01 na NA NA NA NA NA NA 7.30E+02 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA NA NA NA NA	Styrene	1.00E-06	1.06E+03	9.47E-10	ou	8.78E-04	2.13E+05	4.12E-09	92
8.59E-07 7.30E+02 1.18E-09 no 3.01E-03 5.01E-07 NV 1.43E-07 6.21E+00 2.31E-08 no 5.02E-04 2.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 2.80E-01 na NA NA 2.80E-01 na NA NA 2.80E-01 na NA NA NV na NA NA NV na NA NA 7.30E+01 na N	1,1,2,2-Tetrachloroethane	NA	3.31E-02		na	NA	2.06E+04		na
5.01E-07 NV na 1.76E-03 1.43E-07 6.21E+00 2.31E-08 no 5.02E-04 2.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 3.30E+00 na NA NA 2.80E-01 na NA NA NV na NA NA 8.73E-02 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA	o-Xylene	8.59E-07	7.30E+02	1.18E-09	no	3.01E-03	6.51E+05	4.62E-09	OU
1.43E-07 6.21E+00 2.31E-08 no 5.02E-04 2.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 3.30E+00 na NA NA 2.80E-01 na NA NA 2.09E+02 na NA NA 8.73E-02 na NA NA 7.30E+01 na N	p-Ethyltoluene	5.01E-07	N		na	1.76E-03	1.25E+05	1.40E-08	ou
2.86E-07 6.21E+00 4.61E-08 no 1.00E-03 NA 4.00E-02 na NA NA 3.30E+00 na NA NA 2.09E+02 na NA NA NV na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA NA NA NA NA	1,3,5-Trimethylbenzene	1.43E-07	6.21E+00	2.31E-08	no	5.02E-04	3.68E+05	1.36E-09	no
NA 4.00E-02 na NA NA 3.30E+00 na NA NA 2.09E+02 na NA NA NV na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NA NA NA NA NA NA NA NA NA	1,2,4-Trimethylbenzene	2.86E-07	6.21E+00	4.61E-08	no	1.00E-03	1.80E+05	5.57E-09	ou
NA 3.30E+00 na NA NA 2.80E-01 na NA NA 2.09E+02 na NA NA NV na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA	Benzylchloride	NA	4.00E-02		na	NA	5.20E+03		na
NA 2.80E-01 na NA NA 2.09E+02 na NA NA NV na NA NA 7.30E+01 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA	m-Dichlorobenzene	A A	3.30E+00		na	NA	3.61E+04		na
NA 2.09E+02 na NA NA NV na NA NA 8.73E-02 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA NA NV na NA	p-Dichlorobenzene	A A	2.80E-01		na	NA	6.61E+05		na
NA NV na NA NA 8.73E-02 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA NA NV na NA	o-Dichlorobenzene	NA	2.09E+02		na	NA	3.01E+05		na
NA 8.73E+01 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA NA NV na NA	1,2,4-Trichlorobenzene	ΝΑ	N		na	NA	3.71E+04		na
NA 7.30E+01 na NA NA 7.30E+01 na NA NA NV na NA NA NV na NA	Hexachlorobutadiene	NA	8.73E-02		na	NA	3.21E+04		na
NA 7.30E+01 na NA NA NV na NA NA NV na NA	trans-1,2-Dichloroethene	ΝΑ	7.30E+01		na	NA	4.95E+04		na
NA NV na NA NA NV na NA	o-Chlorotoluene	AN	7.30E+01		na	NA	3.88E+05		na
NA NA NA	p-Chlorotoluene	AN	N		na	NA	3.88E+05		na
	1,3,5-Trichlorobenzene	NA	N/		na	NA	AN		na

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

			Si	gnal Illumi	Signal Illumination M159	6		
Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	> 1?
1,2,3-Trichlorobenzene	AN	> <u>N</u>		na	ΝΑ	5.00E+04		na
Methylnitrite	3.01E-06	N		na	VΑ	AN		na
Acetonitrile	6.15E-07	6.20E+01	9.92E-09	ou	2.15E-03	1.01E+05	2.14E-08	OL
Acrylonitrile	2.45E-07	2.80E-02	8.77E-06	ou	5.02E-04	2.20E+04	2.28E-08	OU
Nitromethane	2.55E-06	NN		na	8.94E-03	1.50E+05	5.96E-08	01
Benzonitrile	3.66E-07	NV		na	1.28E-03	1.50E+04	8.55E-08	no
Nitrobenzene	NA	2.09E+00		na	NA	1.51E+04		na
Carbonyl Sulfide	2.25E-07	NV		na	7.87E-04	9.84E+03	8.00E-08	OU
Sulfur Dioxide	NA	NV		na	AN	7.80E+02		na
Carbon Disulfide	7.65E-06	7.30E+02	1.05E-08	ou	2.68E-02	3.73E+04	7.19E-07	no
Thiophene	1.21E-07	NV		na	AN	NA		na
Dimethyldisulfide	NA	NV		na	NA	4.00E+01		na
2-Methylthiophene	NA	NV		na	AN	NA		na
3-Methylthiophene	ΑN	NV		na	NA	NA		na
Dimethyltrisulfide ·	NA	N		na	AN	AN		na
Isothiocyanatomethane	A A	N		na	Ϋ́	NA		na
2-Chlorothiophene	Ϋ́	N		na	۷	NA		na
3-Chlorothiophene	AN	N		na	NA	NA		na
2-Thiophenecarboxaldehyde	AN	>N		na	NA	NA		na
Naphthalene	1.57E-06	3.13E+00	5.02E-07	ou	5.50E-03	7.86E+04	7.00E-08	no
Acetaldehyde	1.80E-07	8.70E-01	2.07E-07	Ou	3.69E-04	1.80E+04	2.05E-08	no
Acrolein	2.12E-06	2.10E-02	1.01E-04	ou	1.86E-03	2.30E+02	8.08E-06	no
Acetone	6.26E-06	3.40E+02	1.84E-08	no	2.19E-02	2.37E+06	9.25E-09	no
Propanal	1.41E-06	2		na	4.95E-03	7.50E+04	6.60E-08	no
Furan	3.21E-06	3.70E+00	8.66E-07	ou	1.12E-02	1.67E+02	6.73E-05	no
2-Propanol	Ϋ́	≥		na	NA	9.84E+05		na
2-Methylpropanal	ΑΝ	N		na	NA	NA		na
Methacrolein	A A	≥		na	AN.	NA		na
2,3-Butanedione	NA	N		na	AN	NA		na
Methyl-Vinyi Ketone	A A	N		na	AN	8.61E+01		na
MTBE	¥	3.10E+03		na	A A	4.32E+05		na
Butanal	AN A	N/		na	NA	7.38E+04		na





Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

			S	gnal Illum	Signal Illumination M159	6		
Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асиtе} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	> 1?
2-Butanone	1.72E-06	1.00E+03	1.72E-09	on	6.03E-03	8.85E+05	6.82E-09	no
Tetrahydrofuran	3.04E-07	9.89E-01	3.08E-07	ou	1.07E-03	7.38E+05	1.45E-09	no
2-Methyl-1-propanol	NA	1.10E+03		na	NA	4.55E+05		na
trans-2-Butenal	NA	3.54E-03		na	NA	NA		na
Acetic Acid	AN	N		na	NA	3.68E+04		na
2-Pentanone	5.30E-06	N		na	1.86E-02	8.80E+05	2.11E-08	no
Pentanal	2.78E-07	NN		na	AN	NA		na
4-Methyl-2-pentanone	NA	8.30E+01		na	NA	3.07E+05		na
trans-2-Pentenal	NA	NV		na	NA	NA		na
Cyclopentanone	9.24E-07	NN		na	NA	NA		na
2-Hexanone	NA	5.11E+00		na	NA	4.09E+04		na
Hexanal	NA	NV		na	NA	NA		na
3-Furaldehyde	2.82E-07	NN		na	NA	NA		na
Butyl Acetate	9.13E-07	NN		na	NA	NA		na
2-Furaldehyde	1.91E-06	5.20E+01	3.68E-08	no	6.71E-03	7.86E+03	8.53E-07	no
trans-2-Hexenal	NA	N		na	NA	NA		na
1-Hexanol	NA	N		па	NA	8.36E+03		na
3-Heptanone	9.01E-09	N		na	AN	NA		na
2-Heptanone	NA	N		na	AA	1.70E+03		na
Heptanal	1.32E-07	N		па	ΝΑ	NA		na
trans-2-Heptenal	NA	N		па	ΥA	ΝΑ		na
5-Methyl-2-furaldehyde	NA	≥N		na	NA V	ΑΝ		na
6-Methyl-2-heptanone	ΝΑ	N		па	ΝA	NA		na
Benzaldehyde	1.34E-06	3.70E+02	3.62E-09	no	4.69E-03	1.50E+04	3.13E-07	no
1-Heptanol	NA	Š		na	ΑN	NA		na
6-Methyl-5-hepten-2-one	Ϋ́	N		na	NA	NA		na
2-Octanone	AN	N		na	NA	NA		na
Octanal	3.85E-07	N		na	NA	NA		na
Benzofuran	1.13E-06	N		na	NA	NA		na
trans-2-Octenal	NA	N N		na	NA	NA		na
Acetophenone	8.83E-07	2.10E-02	4.20E-05	no	3.09E-03	3.00E+04	1.03E-07	no
2-Nonanone	NA NA	N		na	AN	NA		na

Table D-2: Comparison of Air Concentrations With Health-Based Values: Volatile Organic Compounds

			S	ignal Illumi	Signal Illumination M159	6		
Compound (a)	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	>1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	C _{acute} / ATV	>12
Nonanal	3.86E-07	N N		na	ĄN	ΑN		na
trans-2-Nonenal	AN	N		na	AN	ΝΑ		na
2-Decanone	AN	N		na	AA	NA		na
Decanal	1.20E-06	N		na	NA	NA		na
1								

Footnotes:

(a) Items in bold represent duplicate values for those compounds that are common for Method TO-14 and TO-12.

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

Cehronic = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

Cacute = Acute concentration

ATV = Acute toxicity value

Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

			S	gnal Illumi	Signal Illumination M159	59		
Compound	C _{chronic} (µg/m³)	Heaith-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 12	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	× 12
Particulate/Vapor-phase SVOCs								
N-Nitrosodimethylamine	AN	1.40E-04		na	AN	2.50E+03		na
Pyridine	NA	3.65E+0C		na	AN	4.85E+04		na
2-Picoline	AN	N/		เมล	AN	AN		na
Methyl methanesulfonate	AN	N		na	ΑN	AN		na
N-Nitrosomethylethylamine	NA	3.06E-04		na	ΑN	NA		na
N-Nitrosodiethylamine	NA	4.47E-05		na	ΑN	AN		na
Ethyl methanesulfonate	ΝΑ	NV		ua	ΑN	NA		na
Phenol	NA	2.19E+03		eu	A A	3.85E+05		na
Aniline	NA	1.06E+00		na	ΑN	2.29E+04		na
bis(2-Chloroethyl)ether	NA	5.80E-03		na	ΑN	5.85E+04		na
Pentachloroethane	NA	N\		ua	ΑN	AN		na
2-Chlorophenol	NA	1.80E+01		na	ΑN	5.25E+03		na
1,3-Dichlorobenzene	AN	NN		па	AN	NA		na
1,4-Dichlorobenzene	NA			eu	AA	6.61E+05		na
Benzyl alcohol	AN	1.		na	NA	5.53E+04		na
2-Methylphenol	AN			na	AN	6.63E+04		na
1,2-Dichlorobenzene	AN			na	AN	3.01E+05		na
bis(2-Chloroisopropyl)ether	ΑN			na	Ϋ́	6.99E+04		na
o-Toluidine	AN	2.8		na	Ϋ́	2.63E+04		na
4-Methylphenol/3-Methylphenol	NA	- 1		na	NA	6.63E+04		na
N-Nitroso-di-n-propylamine	AN	9.61E-04		na	AN	5.32E+03		na
Acetophenone	4.20E-07	- 1	2.00E-05	ou	1.47E-03	1.47E+05	1.00E-08	no
N-Nitrosomorpholine	AN I			na	ΑN	3.00E+04		na
N-Nitrosopyrrolidine	AN			na	AA	NA		na
Hexachloroethane	AN	1		na	A A	2.90E+04		na
Nitrobenzene	AA.	2.0		na	ΑN	1.51E+04		na
N-Nitrosopiperidine	AN			na	AN	NA		na
Isophorone	Ϋ́			na	NA	2.83E+04		na
2,4-Dimethylphenol	AN	7.3		na	NA	NA		na
2-Nitrophenol	ΝΑ	N		na	NA	NA		nä
bis(2-Chloroethoxy)methane	AN	N		na	NA	NA		na
Benzoic acid	AN	1.50E+04		na	NA	1.25E+04		na
2,4-Dichlorophenol	AN	1.10E+01		na	۸N	3.00E+04		na

Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

			ગુંડ	gnal Illumii	Signal Illumination M159	6		
Compound	C _{chronic} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} /	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (µg/m³)	Cacute/ ATV	> 1?
1,2,4-Trichlorobenzene	ΑN	Š		na	ΑN	3.71E+04		na
Naphthalene	6.13E-07	3.13E+00	1.96E-07	OU	2.15E-03	7.86E+04	2.73E-08	no
p-Chloroaniline	NA	1.46E+01		na	NA	5.21E+03		na
2,6-Dichlorophenol	NA	2		na	NA	3.00E+04		na
Hexachloropropene	ΑN	N		na	NA	NA		na
Hexachlorobutadiene	ΑN	8.73E-02		na	NA	3.21E+04		na
Dimethylphenethylamine	ΑN	≥		ua	NA	NA		na
N-Nitroso-di-n-butylamine	ΑN	1.20E-03		ua	NA	NA		na
4-Chloro-3-methylphenol	ΑN	N		eu	NA	NA		na
Safrole	ΑN	N<		na	NA	NA		na
2-Methylnaphthalene	ΑN	N		na	NA	2.00E+04		na
1,2,4,5-Tetrachlorobenzene	AN	1.10E+00		na	NA	3.00E+04		na
Hexachlorocyclopentadiene	AN	7.30E-02		na	AN	2.23E+02		na
2,4,6-Trichlorophenol	AN	6.20E-01		na	NA	3.00E+04		na
2,4,5-Trichlorophenol	NA	3.70E+02		na	NA	3.00E+04		na
Isosafrole	NA	NV		na	NA	AN		na
2-Chloronaphthalene	NA	2.90E+02		na	A V	6.00E+02		na
2-Nitroaniline	NA	2.10E-01		na	NA	NA		na
1,4-Naphthoquinone	NA	NV		na	NA	2.50E+02		na
Dimethylphthalate	NA	3.65E+04		na	NA	1.50E+04		na
1,3-Dinitrobenzene	NA	3.70E-01		na	٩	3.00E+03		na
2,6-Dinitrotoluene	NA	3.70E+00		na	Ϋ́	6.00E+02		na
Acenaphthylene	A A	≥		na	ΑN	2.00E+02		na
3-Nitroaniline	Ϋ́	2		na	AN	A A		na
4-Nitrophenol	NA	2.90E+01		na	ΥN	3.00E+04		na
2,4-Dinitrophenol	NA	7.30E+00		na	ΑN	7.50E+03		na
Acenaphthene	AN	2.20E+02		na	AN	1.25E+03		na
2,4-Dinitrotoluene	NA	7.30E+00		na	NA	6.00E+02		na
Dibenzofuran	NA	1.46E+01		na	NA	1.50E+00		na
Pentachlorobenzene	NA	2.92E+00		na	NA	3.00E+04		na
1-Naphthylamine	NA	N		na	AA	3.50E+04		na
2-Naphthylamine	ΑΝ	N		na	AN	7.50E+03		na
2,3,4,6-Tetrachlorophenol	A'N	1.10E+02		na	ΑΝ	NA		na
Diethylphthalate	1.24E-06	2.92E+03	4.25E-10	OL	4.35E-03	1.50E+04	2.90E-07	9





Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

			Si	gnal Illumi	Signal Illumination M159	69		
Compound	С _{сьгопіс} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chro:ulc} / HBSL	> 1?	C _{acute} (µg/m³)	Acute Toxicity Value (μg/m³)	Cacute/ ATV	> 1?
4-Chlorophenylphenyl ether	NA	N/		na	AN.	NA		na
Fluorene	AN	1.46E+02		na	AN	7.50E+04		na
5-Nitro-o-toluidine	NA	2.00E-01		na	ΑΝ	AN		na
4-Nitroaniline	NA	NV		na	ΑΝ	9.00E+03		na
4,6-Dinitro-2-methylphenol	NA	3.65E-01		na	ΑΝ	5.00E+02		na
Diphenylamine/N-NitrosoDPA	NA	NN		na	NA	2.50E+03		na
sym-Trinitrobenzene	NA	1.10E+02		na	Ϋ́	3.00E+04		na
Diallate	NA	1.10E-01		na	Ϋ́	AN		na
Phenacetin	NA	NV		na	ΑN	3.00E+04		na
4-Bromophenylphenyl ether	NA	NV		na	Ϋ́	AA		na
Hexachlorobenzene	NA	4.18E-03		na	ΥN	7.50E+01		na
4-Aminobiphenyl	NA	N		na	Ϋ́	1.50E+03		na
Pronamide	NA	2.74E+02		па	ΑN	AN		na
Pentachlorophenol	NA	5.60E-02		na	NA	1.50E+03		na
Pentachloronitrobenzene	NA	2.59E-02		na	Ϋ́	1.50E+03		na
Phenanthrene	NA	NV		na	NA	2.00E+03		na
Anthracene	ΑN	1.10E+03		na	NA	6.00E+03		na
Carbazole	ΑN	3.36E-01		na	NA	NA		па
Di-n-butylphthalate	1.26E-06	3.65E+02	3.45E-09	ou	4.42E-03	1.50E+04	2.94E-07	no
4-Nitroquinoline-1-oxide	NA	N<		na	NA	ΑΝ		na
Methapyrilene	A V	N		na	NA	AN		na
Fluoranthene	NA NA	1.50E+02		na	ΑN	3.00E+01		na
Benzidine	ΑN	2.90E-05		na	ΑN	5.00E+02		na
Pyrene	NA	N		na	NA	1.50E+04		na
p-Dimethylaminoazobenzene	AA	N.		na	Ϋ́	7.50E+04		na
Chlorobenzilate	ΑA	2.49E-02		na	Ϋ́	2.50E+02		na
Kepone	NA	3.74E-04		na	NA	1.00E+02		na
Butylbenzylphthalate	A A	7.30E+02		na	NA	5.00E+05		na
3,3'-Dimethylbenzidine	ΑĀ	7.30E-04		na	Ϋ́	3.00E+00		na
2-Acetylaminofluorene	AN	N		na	Ϋ́	2.50E+03		na
bis(2-Ethylhexyl)phthalate	1.84E-06	4.80E-01	3.83E-06	no	1.50E-02	1.00E+04	1.50E-06	no
3,3'-Dichlorobenzidine	Y.	1.50E-02		na	NA	6.21E+03		na
Benz(a)anthracene	¥.	2.20E-02		na	ΝΑ	6.00E+02		na
Chrysene	NA	2.17E+00		na	AN	2.00E+02		na

Table D-3: Comparison of Air Concentrations With Health-Based Values: Semi-Volatile Organic Compounds

			S	Signal Illumination M159	nation M15	69		
Compound	С _{сһronіс} (µg/m³)	Health-Based Screening Level (µg/m³)	C _{chronic} / HBSL	> 1?	С _{асиtе} (µg/m³)	Acute Toxicity Value (µg/m³)	C _{acute} / ATV	> 12
Di-n-octylphthalate	ΑN	7.30E+01		па	Ϋ́	1.50E+05		na
7,12-Dimethylbenz(a)anthracene	ΑN	≥N		na	ΑN	ΑN		na
Benzo(b)fluoranthene	NA	2.20E-02		na	AN	AN		na
Benzo(k)fluoranthene	AN	2.20E-01		na	AN	AN		na
Benz(a)pyrene	AN	2.20E-03		na	ΑN	7.50E+03		na
3-Methylcholanthrene	NA	N/		na	AN	1.50E+03		na
Indeno(1,2,3-cd)pyrene	NA	2.17E-02		ua	AN	ΑN		na
Dibenz(a,h)anthracene	NA	2.17E-03		na	NA	3.00E+04		na
Benzo(g,h,i)perylene	NA	NV		na	NA	3.00E+04		na
					1110000			

Footnotes:

NA = Not applicable

na = Not available because health-based screening value is not available or not applicable because compound was not detected.

NV = No value

C_{chronic} = Chronic time-averaged concentration

HBSL = Chronic health-based screening level

C_{acute} = Acute concentration

ATV = Acute toxicity value

Table D-4: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons

		Signal IIIum	Signal Illumination M159	
Compound (a)	С _{chronic} (µg/m³)	C _{chronic} (µg/m³)	C _{chronic} (µg/m³)	С _{сhronic} (µg/m³)
	Aliphatic:C<=8	Aliphatic:C>8	Aromatic:C<=8	Aromatic:C>8
Propane	2.53E-06	AN	AN	NA
Propene	1.58E-05	NA	NA	NA
i-Butene	1.83E-06	AN	NA	NA
1-Butene	2.96E-06	NA	NA	NA
trans-2-Butene	1.55E-06	AN	NA	NA
cis-2-Butene	7.74E-07	NA	NA	NA
3-Methyl-1-butene	4.22E-07	NA	NA	NA
1-Pentene	2.81E-07	AN	NA	NA
2-Methyl-1-butene	2.81E-07	NA	NA	NA
trans-2-Pentene	2.11E-07	NA	NA	NA
cis-2-Pentene	2.81E-07	ΝΑ	NA	NA
2-Methyl-2-butene	4.22E-07	NA	AN	NA
Cyclopentene	2.11E-07	NA	NA	NA
Cyclopentane	1.41E-07	NA	NA	NA
3-Methylpentane	3.52E-07	NA	NA	NA
1-Hexene	3.52E-07	NA	NA	NA
Methylcyclopentane	2.81E-07	۷V	NA	NA
Benzene	NA	NA	1.05E-05	NA
2-Methylhexane	1.41E-07	NA	NA	NA
2,2,4-Trimethylpentane	2.11E-07	NA	NA	NA
n-Heptane	1.41E-07	NA	NA	NA
2,5-Dimethylhexane	1.41E-07	NA	AN	NA
2,4-Dimethylhexane	1.41E-07	NA	NA	NA
2,3,4-Trimethylpentane	2.11E-07	NA	AN	NA
Toluene	NA	NA	3.87E-06	NA
2-Methylheptane	1.41E-07	ΑN	NA	NA
n-Octane	3.52E-07	۷N	AN	NA
Ethylbenzene	NA	NA	1.41E-06	NA
m-Xylene & p-Xylene	ΑN	NA	4.08E-06	NA
Styrene	NA	NA	AN	9.85E-07
o-Xylene	AN	NA	8.44E-07	NA

Table D-4: Comparison of Air Concentrations With Health-Based Values: Total Petroleum Hydrocarbons

		Signal Illumi	Signal Illumination M159	
Compound (a)	C _{chronic} (µg/m³)	С _{chronic} (µg/m³)	С _{сhronic} (µg/m³)	C _{chronic} (µg/m³)
	Aliphatic:C<=8	Aliphatic:C>8	Aromatic:C<=8	Aromatic:C>8
n-Nonane	NA	6.33E-07	NA	NA
n-Propylbenzene	ΑN	NA	NA	1.41E-07
p-Ethyltoluene	NA	NA	NA	4.93E-07
m-Ethyltoluene	NA	VΝ	NA	2.11E-07
1,3,5-Trimethylbenzene	NA	VΝ	NA	1.41E-07
o-Ethyltoluene	NA	ΝA	NA	1.41E-07
1,2,4-Trimethylbenzene & sec-Butylbenzene	NA	AN	NA	2.81E-07
Benzene	NA	AN	1.07E-05	NA
Toluene	AN	NA	3.94E-06	NA
Ethylbenzene	AN	NA	2.16E-06	NA
m&p-Xylene	NA	NA	4.15E-06	NA
Styrene	NA	NA	NA	1.00E-06
o-Xylene	NA	NA	8.59E-07	NA
p-Ethyltoluene	NA	NA	NA	5.01E-07
1,3,5-Trimethylbenzene	NA	AN	NA	1.43E-07
1,2,4-Trimethylbenzene	NA	NA	NA	2.86E-07
Naphthalene	NA	NA	NA	1.57E-06
Naphthalene	NA	NA	NA	6.13E-07
Total (µg/m³)	3.02E-05	6.33E-07	2.18E-05	3.49E-06
Derived Health-Based Screening Level	1.92E+04	1.04E+03	4.17E+02	2.09E+02
C _{chronic} /HBSL	1.57E-09	6.07E-10	5.22E-08	1.67E-08
>1?	01	ou 0	no	ou

Footnotes:

(a) Items in bold represent duplicate values: highest concentration was used to estimate total petroleum hydrocarbon concentration

>1? = Is the ratio greater than one?

NA = Not Applicable because compound was not detected

Cchronic = chronic averaged air Concentration

HBSL = Health-Based Screening Level

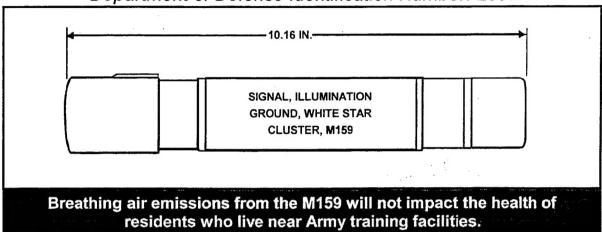




APPENDIX E FACT SHEET SUBMITTED TO AEC

United States Army Environmental Center Pyrotechnics Fact Sheet

M159 White Star Cluster Signal Illumination Department of Defense Identification Number: L307



WHAT ARE PYROTECHNICS?

The terms pyrotechnics and fireworks are often used interchangeably. Pyrotechnics give off smoke, light, and/or a loud noise when activated. The military uses pyrotechnics for signaling, obscuring, and illuminating during training and combat.

WHAT IS THE M159?

The M159 is one of several types of ground pyrotechnic signals. It produces five white-colored free-falling stars. It is about 10 inches long, 2 inches wide, and weighs approximately 1 pound.

HOW IS THE M159 USED?

The M159 is used for signaling and illuminating. A rocket containing the signal is launched from a hand-held device. After launching, the rocket reaches a height of about 200 feet at which point, the star clusters are released. The stars extend to a

maximum height between 650 and 800 feet (about the height of a 65 story building). Troops use the star cluster signals to communicate with one another. The light it provides can also be used for other purposes. For example, it can provide light for nighttime ground operations or it can be used to reveal an enemy's suspected hiding place.

WHERE IS THE M159 USED?

Many Army training events use the M159. Nearly every Army training installation holds these events. At most locations, the training areas are at least 1000 meters (over half a mile) away from populated areas. In general, two of these items are used during a day of training, which typically occurs five times a year.

WHAT IS IN THE M159?

The M159 is made up of a rocket motor propulsion assembly contained in an

aluminum launching tube. The illuminant is made up mostly of barium nitrate and magnesium powder. It also contains black powder which is used in many commercial fireworks. Black powder consists mostly of potassium nitrate.

WILL BREATHING AIR EMISSIONS FROM THE M159 AFFECT MY HEALTH?

To answer this question, the U.S. Army Environmental Center tested the air emissions from the M159. The U.S. Army Center for Health Promotion and Preventive Medicine then determined if there would be a potential for health effects from inhalation to residents living near training areas. Study results showed that residents breathing air as close as 100 meters (328 feet) from the activation site are safe from these emissions.

HOW WAS THE STUDY DONE?

To gather data for the study, airborne emissions data was collected by activating the M159 in a test chamber. The air in the chamber was tested to identify the types and amounts of substances released. More than 300 substances were looked for during this part of the study.

This information was then used in an air model (a computer program that allows estimation of air concentrations) to determine the amount of each substance, to which someone living near a training site might be exposed. Downwind concentrations were estimated based on a typical use

scenario for the M159. Since the study does not look at a specific training area, the assumptions used in the model will in most cases, predict higher downwind air concentrations than those expected at an actual training site.

These estimated air concentrations were then compared to safe screening levels established by the U.S. Environmental Protection Agency and other agencies. If the air concentrations are below these screening levels, they are considered safe for everyone, including sensitive people such as the sick, elderly, and children.

WHAT ARE THE LIMITATIONS OF THIS STUDY?

Many steps were taken to ensure that the results of this study are protective of everyone who lives close to training areas. However, limitations do exist with this study. For example, the study does not consider exposure to other types of munitions that could also be used during the same training event. Due to these limitations, conservative model conditions were used to ensure the protection of public health from inhalation of the M159 air emissions.

WHERE CAN I GET MORE INFORMATION?

Additional information on the M159 and other military munitions can be obtained by calling the Army Environmental Center Hotline at 1-800-USA-3845 or email to t2hotline@aec. apgea.army.mil. Please also visit our website at www.aec.army.mil